

# Municipal Journal

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## THE AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS

**Twenty-One Years of Growth and Activity—The Society's Standard Specifications for Paving and Sewerage—Advantages of Membership—Members Found Generally Throughout the United States and Canada**

The American Society of Municipal Improvements this year, at its annual convention in Dayton, Ohio, next week, celebrates its "coming of age."

Twenty-one years ago, on September 19th, 1894, it was organized with a membership of 60 municipal officials, which met at the invitation of M. J. Murphy, then street commissioner of St. Louis. To-day it has nearly ten times that number and is one of the most influential of the societies dealing with municipal affairs, and is the only one in its particular field. The increase in membership has not been spread uniformly over the whole twenty-one years, but has occurred almost entirely since 1904, when there were only 104 members. About 225 members have been added during the past five years, and the indications are that a similar or more rapid rate of growth will continue. This growth has been uniform and healthy and not due to any strenuous campaign for members. Moreover, there is no "dead wood" among it, but members who do not retain sufficient interest in the society to keep up their dues are dropped from the rolls.

One of the great advantages of this society is and always has been the opportunity it offers to the younger members holding municipal positions, and especially those of an engineering nature, to take part in the discussions and to come into personal contact with engineers prominent in municipal work. Every member is encouraged to discuss each paper and to ask any question by which he may obtain further information on the subject treated of, and the meetings generally develop more general and informative discussion than those of any other society with which we are familiar. In this way the society is of great assistance to the less experienced members, and it is doubtful if any who have attended a convention in recent years have gone away without feeling that the fullest opportunity has been afforded them for obtaining information on any problem in municipal improvements which was bothering them, if such information was possessed by any members of the society.

Although a very large percentage of the engineers of the smaller and medium size cities of the country are represented in the membership of the society, it is by no means confined to these, but numbers among the mem-

bers a majority of those of national reputation. Going at random through the alphabetical list of members, for instance, we find the following well-known names: John W. Alvord, consulting engineer of Chicago; George H. Benzenberg, consulting engineer of Milwaukee; A. H. Blanchard, professor of highway engineering in Columbia University; A. W. Dow, consulting engineer of New York; George G. Earl, superintendent of New Orleans Sewerage and Water Board; Harrison P. Eddy, consulting engineer of Boston; J. T. Fetherston, commissioner of street cleaning of New York City; E. A. Fisher, city engineer of Rochester, N. Y.; George W. Fuller, consulting engineer of New York; Rudolph Hering, consulting engineer of New York; Nelson P. Lewis, chief engineer, Board of Estimate and Apportionment of New York; Charles H. Rust, city engineer of Victoria, B. C.; Morris R. Sherrerd, chief engineer of the Department of Public Works, Newark, N. J.; A. N. Talbot, professor of Municipal and Sanitary Engineering, University of Illinois; George W. Tillson, consulting engineer to the Borough President of Brooklyn, N. Y.; H. M. Waite, city manager of Dayton; Professor George C. Whipple of Harvard University. The above are but a few names which met the eye in glancing hastily through the membership list, and many others of prominence are contained in it. Most of these are generally present at the meetings of the society and enter into the discussions of the various topics introduced, giving the members the benefit of their expert information.

The idea of the founders of this society was to bring together all classes of officials who are interested in the physical improvement of cities—engineers, superintendents, chairmen of council committees, etc.—in order that each might thus obtain the points of view of the others, the aim being to secure a more complete mutual understanding and harmony of action in the several branches of government. As the society has developed and "found itself," the engineering side of the problems has come more and more to the fore, until at the present time a large part of the discussion of each topic is from an engineering point of view. The original idea, however, still obtains to a considerable degree, and legislative and



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administrative problems, city charters, finances and similar subjects still receive quite a little attention by the society. In fact, the society and Municipal Journal occupy almost identical fields, and the subjects are discussed from the same points of view.

#### ADVANTAGES OF MEMBERSHIP.

The importance of any society might be gauged by (1) what it does for its members and (2) what it does for society at large. Considering the first, this society, like most organizations of a similar nature, offers opportunities for wider acquaintance among those engaged in similar lines of work and for obtaining actual information through personal contact with other members, through the papers and discussions at the conventions, through the literature published by the society, and the offices of the Clearing House. It also offers opportunities for that class of advertising of one's work and abilities which is recognized as legitimate among all professions, in that it is incidental to the conferring of benefits on fellow-members—the presentation of papers giving the results of experience and describing work constructed. The papers which have been read and discussed before this society are recognized as being of such value that the "Proceedings" in which they are published are purchased regularly by libraries of engineering schools, by cities both large and small, by the Congressional Library, etc.

Another direction in which the society endeavors to aid the individual members is by means of a clearing house of municipal information, which is conducted by the secretary's office, the aim of which is to furnish to any member inquiring for the same, information concerning conditions in other cities throughout the country. Typical questions for which answers have been collected by the clearing house are: "What systems of house numbering are employed in the various cities of the country?"; "What disposition is made of city refuse in the various cities?"; "Experience of various cities with wood block pavements in bleeding, swelling, etc." One city engineer, on receiving the information asked for, wrote a most appreciative letter to the secretary, stating that the information obtained for him in response to his inquiry was worth more to him and to his city than the total of all his past and future membership dues.

About ten years ago, believing that the members could learn much from an actual inspection of the newest appliances and materials used in municipal construction, such as paving materials, sewer pipe, water meters, etc., the society invited dealers and manufacturers to exhibit such of their materials as they desired at the conventions of the society, joining the society under a special class

known as "associate members." There is no doubt that considerable benefit has been derived by both the active members and associate members from these exhibits, which have been a feature of each year's convention since 1904. The number of associate members in the society last year was 81, practically all of which join in the annual exhibit of appliances.

Several city officials connected with both large and small cities have expressed in writing their appreciation of the benefits offered by the society. One city engineer wrote:

I feel that my membership in this association has been a direct personal benefit from my acquaintance and social intercourse with a large number of engineers doing municipal work in all parts of the United States and Canada, whom I have had the opportunity of meeting and discussing matters of interest at the conferences. Many of these discussions have covered subjects not treated in the various papers presented to the society.

Having the opportunities to become personally acquainted with various engineers, as above specified, I have felt at liberty to call upon these men in person when visiting their cities, with the assurance that I would be shown every courtesy of a personal acquaintance.

Again, in writing to fellow members, whether personally acquainted or not, concerning matters that they were dealing with, I have found that a prompt, personal response was always forthcoming with all desired information. Also, the Clearing House has been a source of information to me on one or two occasions.

The city engineer of a small town wrote:

I want to express at this time the great satisfaction it is to me to realize that I have the privilege of calling upon the secretary at any time for information and advice upon municipal subjects. He has certainly been a "friend in need" to me and I expect soon to call upon him again for information.

A paving brick manufacturer said:

As a manufacturer, it seems to me that the American Society presents a better opportunity for the manufacturers to become acquainted with the engineers and municipal authorities than any other association. By such acquaintanceship we are able to work out a better solution of the problems that are of interest to both. The American Society seems to take a more fair attitude towards the manufacturer than other societies that are in existence. While it does not at all times take the action that we, as manufacturers, would like to see it take, still we are convinced that its intentions are honest and that it means to be fair to everybody concerned.

#### HOW THE SOCIETY BENEFITS MUNICIPALITIES.

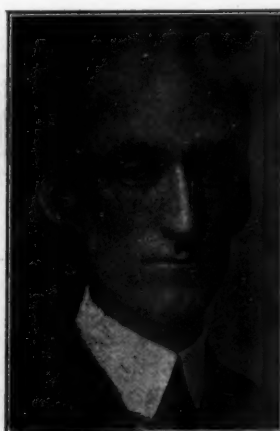
The society aims to benefit not only its members, but also the municipalities by which they are employed, and in fact all of the municipalities of the country. Illustrations of this are offered by the work of the committee on Standard Specifications and of that on Standard



ANDREW F. MACALLUM,  
City Eng., Hamilton, Ont.,  
First Vice-President.



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Supt. Bureau of Construc-  
tion, Pittsburgh, Pa.,  
Second Vice-President.



E. L. DALTON,  
Dallas, Texas,  
Third Vice-President.



W. B. HOWE,  
City Eng., Concord, N. H.,  
Treasurer.



**Forms.** The aim of the latter, which has only begun its work, is to formulate, and secure the general adoption of, standard forms on which cities will report the activities of their various departments, in order that comparisons of the results obtained by various municipalities may be made more readily and with more useful results. Already several cities state in their reports that the units employed in stating work done are those recommended by this society.

Probably the best known work of the society has been its preparation of standard specifications for the modern types of pavement. In November 1909 the society appointed a committee on Standard Specifications, with the idea of carefully preparing a set of specifications for each of the various kinds of pavements, and also for other classes of public work, which would so commend themselves to cities that they would be adopted generally by them and thus secure for all cities the undoubted advantages inherent in the general use of standards for any class of work. This was placed in charge of members of the society which had the highest professional standing throughout the country, and they have progressed with this work slowly but without any lapse of interest. During the succeeding three years they practically completed, and the society adopted, specifications for most of the modern types of pavements which were acceptable to all parties, so far as such universal agreement could be possible; and at the present time we believe only one type of standard pavement is not included in the specifications adopted by the society, and for this type tentative specifications were presented last year and will probably be adopted at the convention this month.

These specifications have been placed in the hands of practically all engineers or other officials engaged in municipal paving work throughout the country, and we believe there are few paving specifications used at the present time which do not agree in most points with those of the American Society of Municipal Improvements; while a great many cities have adopted the specifications entire, several even omitting the publication at length of any specifications, but stating that the work is to be done in accordance with the standard specifications of this society. We doubt whether an equally general acceptance of the conclusions of any society has ever before occurred in this country or a greater benefit been done by any one line of work of any society, with the exception of the well-known standards put forth by the American Society of Civil Engineers for rails, cement specifications and one or two others, and possibly the standards of the American Society for Testing Materials.

#### AMALGAMATION OF ASSOCIATION FOR STANDARDIZING PAVING SPECIFICATIONS.

A few months after this committee began its work, a similar idea of the needs of paving officials led to the organization of an association of city officials known as the Association for Standardizing Paving Specifications, and this society also prepared standard specifications for pavements which were adopted in 1911 and modifications of these and specifications for other pavements in 1912. Almost from the beginning the two societies worked in harmony, and many city officials were members of both; but there were certain more or less important differences between the specifications advocated by them, and this division greatly reduced the benefit to be derived from the work of either. It was felt by many of the members of both that there should be some form of combination or at least closer co-operation between the two organizations, and this was discussed in 1911 and again in 1912. Finally, in October 1913, the society for Standardizing Paving Specifications amalgamated with the American Society of Municipal Improvements, the membership of the two societies being united under the name of the latter organization. Owing to the very considerable duplication of membership in the two societies, however, this led to an actual increase in membership of the older society by only 53.

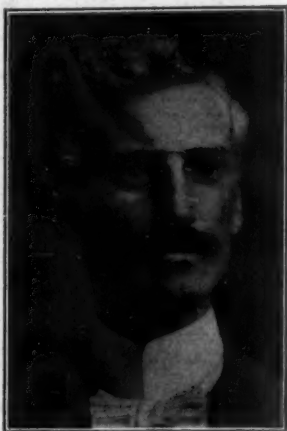
With the combination of these two societies, we now have the American Society of Municipal Improvements as the only society in the country making a specialty of city streets and pavements, and the only one which offers to the cities of the country standard specifications for such pavements. It would therefore seem as though every city official who is interested in paving—and this includes practically all of the city engineers and superintendents of highways—should be members of this society if they are to keep in touch with the developments in this class of work which are taking place so rapidly at the present time.

#### OTHER ACTIVITIES.

This also is the only society specializing in sewer construction and sewage disposal, and in street cleaning and refuse collection and disposal. In each of these lines of municipal activity the society is quite active, and its papers, and especially its discussions, are of the greatest interest and value to all city officials engaged in this class of work and to engineers who act in a consulting capacity in connection therewith. The committee on Standard Specifications has prepared a set of standard specifications for sewer construction, and the committee on Standard Forms is endeavoring to remedy the present non-existence of classified data relative to



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PAST PRESIDENTS OF THE SOCIETY.

street cleaning and refuse disposal, and to a lesser extent to sewerage work.

The society also deals with questions connected with water supply, street lighting, city parks, municipal government and finance; also, in addition to street paving, it considers all other questions involved in the construction and maintenance of streets, such as underground conduits and other structures, sidewalks, curbs and gutters, control of streams crossing city areas, and numerous other topics which from time to time arise to vex the officials of almost every city.

A more definite idea of the topics discussed by the society may be gained from the list of committees in whose hands a large part of its work is placed. These consist of the following:

Street Paving—Traffic on Streets—Street Lighting—Waterworks and Water Supply—Sewerage and Sanitation—Refuse Disposal and Street Cleaning—Park Development and Maintenance—Municipal Legislation and Finance—Fire Prevention—Standard Forms (with sub-committees on Street Paving and Repairs, Street Cleaning and Refuse Disposal, Street Lighting, Sidewalks and Curbs, Sewer Construction and Maintenance, and Uniform Bidding Blanks)—Standard Specifications (with sub-committees on Wood Block, Brick, Bituminous Pavements, Asphalt, Concrete, Stone Block, Broken Stone and Gravel Roads, and Sewers). In addition there are committees which have in charge Convention Papers, Convention Arrangements, and Convention Exhibits. It will be recommended at the convention next week that additional committees be appointed on City Planning, and Sidewalks and Street Design.

The extent to which the several topics receive the attention of the society may be judged by the space in the "Proceedings" occupied by each. During the fifteen years previous to 1909, 44 per cent of the space was devoted to roads and pavements; 19½ per cent to sewerage; 11½ per cent to government and finance; 11 per cent to water supply, and the remainder equally divided between street lighting, street cleaning, and parks; omitting from the calculation about 10 per cent of the total space occupied by miscellaneous subjects.

During the past five years the work of the committee on standard specifications has occupied perhaps one-third of the activities of the society. Omitting from the calculation this and miscellaneous papers presented, we find that of the remainder, sewerage occupied 33 per cent of the space; roads and pavements, 30 per cent; government and finance, 15½ per cent; street cleaning and refuse disposal, 8½ per cent; street lighting, 8 per cent; water supply and parks each 2½ per cent.

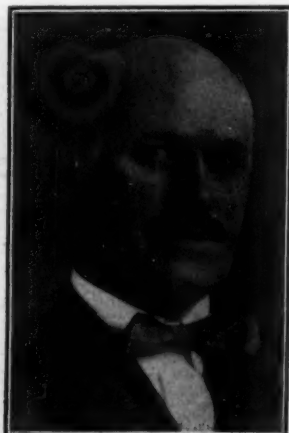
The papers to a marked degree avoid generalities and deal with specific practical problems, which is to a considerable extent the reason why they receive such general and valuable discussion at the meetings, and why those who have once attended a meeting are found to attend all future ones which it is possible for them to reach. There is a considerable number of the older members who have not missed more than one or two meetings in the past ten or fifteen years.

The government of the society is in the hands of a president, three vice-presidents, a secretary and a treasurer, not more than two of which can be from one state. An executive committee, consisting of these officials and of the past presidents who have retained a continuous membership in the society, manages the affairs of the society, subject to the action and approval of the society at its meetings. The officers are elected by ballot at the annual meeting. The committees are appointed by the president. A finance committee audits annually the accounts of the treasurer and secretary. The selection for the places of meeting of the annual conventions is made by the society at the previous convention, but the date is fixed by the executive committee.

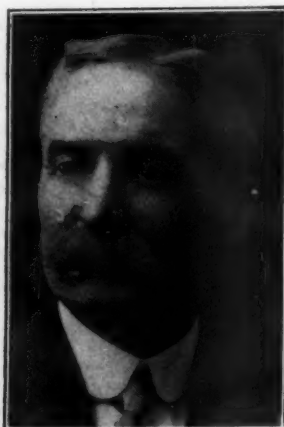
There are three classes of members—active, associate and affiliated. Only the first have the privilege of holding office or voting. To be eligible for active membership an applicant must be a municipal official or be employed (continuously or occasionally) as a consulting engineer on municipal department work. Any contractor or manufacturer of or a dealer in municipal supplies, or an agent of such, may become an associate member. Any one wishing to join the society, but not qualifying under either of these classes, may become an affiliated member. Applicants are admitted to membership by a two-thirds vote of the Executive Committee.

The dues of the society are kept low, but it has no debts and has always maintained a surplus in its treasury. There has never been any internal friction among the members, but the greatest harmony has prevailed throughout its existence. No cliques have come into being (as has been the case in so many other societies) which have endeavored to control the policy or the filling of the official positions of the society, but the conduct has been democratic in the best sense of that word and every opportunity has been offered to every member to exercise his full share of the duties and enjoy his full share of all the privileges which are enjoyed by any member.

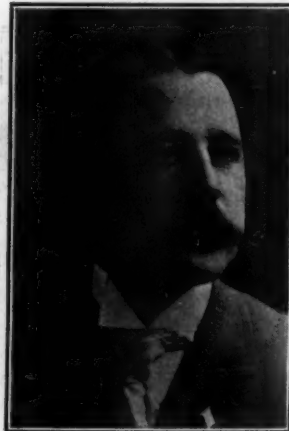
The membership of the society is scattered generally throughout the United States and Canada, there being only one state east of the Rocky Mountains which is



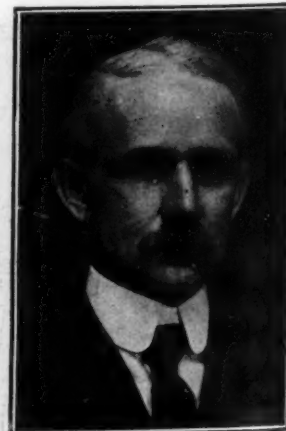
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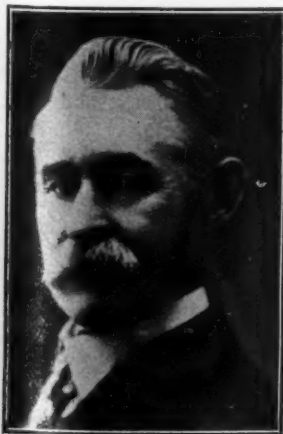
PAST PRESIDENTS OF THE SOCIETY.



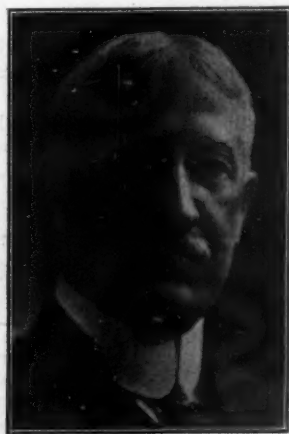
not represented on the membership list and only three or four of those west of the Rockies. Of its conventions, one has been held in New England, six in the Middle Atlantic states, one in the South Atlantic, two in the Gulf states, ten in the central part of the country and two in Canada. Its officials also have been drawn from various sections, its past presidents having been as follows: M. J. Murphy, St. Louis, Mo.; George H. Benzenberg, Milwaukee, Wis.; August Herrmann, Cincinnati, Ohio; Harrison Van Duyne, Newark, N. J.; Nelson P. Lewis, New York City; A. D. Thompson, Peoria, Ill.; Robert E. McMath, St. Louis, Mo.; E. A. Fisher, Rochester, N. Y.; C. H. Rust, Victoria, B. C. (then city engineer of Toronto, Canada); George M. Ballard, Newark, N. J.; A. Prescott Folwell, New York City; Charles C. Brown, Indianapolis, Ind.; Morris R. Sherrerd, Newark, N. J.; George W. Tillson, New York City; James Owen, Montclair, N. J.; Julian Kendrick, Birmingham, Ala.; Fred Giddings, New Orleans, La. (then of Atchison, Kans.); E. A. Kingsley, Little Rock, Ark.; B. E. Briggs, Erie, Pa.; E. H. Christ, Grand Rapids, Mich. The present president is William A. Howell, engineer of streets and highways of Newark, N. J. The three vice-presidents are A. F. Macallum, city engineer of Hamilton, Ont.; Norman S. Sprague, superintendent of the Bureau of Engineering, Pittsburgh, Pa., and E. L. Dalton, Dallas, Tex. (until recently, city engineer). The treasurer is Will B. Howe, Concord, N. H. The secretary is Charles Carroll Brown of Indianapolis, Ind., who succeeded A. Prescott Folwell two years ago. Mr. Folwell had held the position for six years, and George W. Tillson for the six years previous.

The proceedings published by this society are among the most creditable of those gotten out by any of the societies of the country. Those for 1914 contained over 800 pages, all of which consisted of papers and discussions on municipal topics, copies of the standard specifications adopted by the society at its convention of last year, and the business proceedings of that convention. The material is presented in a well arranged and attractive style, without any padding and with every effort to make it convenient for use by the members.

From every point of view, this society is a credit to American cities whose officials form its membership, and especially to that large percentage of its membership which have taken an active part in developing it and maintaining it without a single lapse at as high a professional standard as has been attained by any society in the country.



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of Rochester, N. Y.



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## ASPHALT PAVING IN COLUMBIA

### Determination of Cost by Force Account—Items Entering into Such a Calculation—Description of a Special Case.

By JOHN McNEAL, M. Am. Soc. C. E.\*

City engineers are frequently called upon to prepare estimates on the cost of municipal work to be done by the city force, in order to make a comparison with the cost of similar work done by contract. The writer has prepared a number of estimates of this character and in order to do so intelligently he finds it necessary to be familiar with every detail of the proposed construction; otherwise the estimate will be misleading and fail of the purpose for which it is intended.

Contractors are entitled to a legitimate profit and comparative estimates will, as a rule, show a profit for the contractor. The municipality must then decide whether it prefers to save a fair percentage of the cost or allow contractors to earn it in the proper conduct of their business.

The amount of street paving to be done by a municipality per year, as well as the guaranteed continuation of this yearly yardage, is an important factor in determining the advisability of the installation of a street paving plant for municipal use; for depreciation in the value of the plant, cost of maintenance and overhead charges must all be considered in making an estimate of actual cost of work.

The city of Columbia, S. C., has done a considerable amount of street paving during the past few years, including the best grades of bituminous paving—sheet asphalt, bitulithic and asphaltic concrete; also wood block, vitrified block and a small amount of concrete street paving; all of which, with the exception of the last, were placed on a concrete foundation.

The methods adopted by this department in the paving of the city streets are as follows:

(1) Preliminary tests and chemical analyses are made of all materials to be used in the construction, in order to determine in advance of shipment whether or not they comply with the specifications. Samples for this examination are shipped in advance of the regular shipments in order to avoid delay which might be caused by condemning material after arrival at the work. This preliminary examination has at times saved the contractor's expense, and avoided delay and trouble for the city as well.

(2) Samples are taken from the regular shipments also immediately upon arrival at the plant or work, and similar tests made to see that material delivered complies with the specifications; and other tests as deemed necessary are

\*City Engineer of Columbia, S. C.



RESIDENCE STREET WITH ASPHALT PAVEMENT.

made from time to time as the work progresses. These tests assure the city of proper material before the work is under way.

(3) Daily samples of the bituminous mixtures are taken on the streets by the inspectors and tests made to determine their quality.

(4) Daily or more frequent (sometimes constant) inspection is made at the paving plant also to determine the quality and exactness of the mixtures.

(5) Constant inspection is made on the street to assure complete compliance with the specifications as to depth of material, accuracy of contour and details in general. On sheet asphalt and other bituminous paving the depth of pavement is regulated also by a definite amount of material per box of paving mixture to be laid per square yard of paving. This figure is then adhered to as closely as possible.

(6) Templates, prepared for each street, are used where possible to regulate the proper construction of the crown of the sub-grade, concrete base, and the surface as well; the same crown board being used for each, which practically makes the courses parallel.

R. M. Hudson, contractor, has recently completed a contract for street paving in this city amounting to about 50,000 square yards. I have selected one block of this paving in the preparation of these statements to show the actual cost of the work and the results obtained, as well as the chemical analyses of the asphalt and the grading of the material. This block compares closely with others paved under the same contract and may be taken as an average for the entire paving.

The block was paved with sheet asphalt, consisting of 1½ inches of binder and 2 inches of surface, laid on a concrete base 5 inches thick. The total area of the block paved was 2,406 square yards. The street was 50 feet in width, without car tracks or other obstructions, and was closed to travel during paving operations, thus greatly facilitating the progress of the work.

**Concrete.**—The concrete base was prepared under specification which called for a mixture of 1 part of Portland cement, 3 parts of sand and 6 parts of crushed granite; one barrel of cement to be considered as 3.7 cubic feet. The resulting concrete, when rammed, was to show a slight surplus of mortar on the surface; otherwise the mixture was to be modified within the above aggregate. The concrete base was given a rough finish in order that the binder course would not slide upon it.

Actual quantities of material used show that each cubic yard of concrete required 1.11 barrels of Portland cement, 0.52 cubic yards of sand and 1.29 tons of crushed granite.

**Sand.**—The sand used in the sheet asphalt surface mixture was taken from a pit about one mile from the plant and was used as delivered, as the following screenings show it to be of proper grading:

	Per Cent.
Passing 200-mesh .....	3.0
Passing 100-mesh .....	10.0
Passing 80-mesh .....	6.0
Passing 50-mesh .....	28.0
Passing 40-mesh .....	8.0
Passing 30-mesh .....	21.0
Passing 20-mesh .....	19.0
Passing 10-mesh .....	5.0
	100.0

**Asphalt.**—The asphalt used in both binder and surface mixture was Aztec or Mexican asphalt, prepared for use as asphalt cement at the refinery.

The following chemical analysis shows its satisfactory quality:

Penetration at 77 degrees F.....	60
Ductility at 77 degrees F.....	over 100 cm.
Bitumen soluble in carbon tetrachloride.....	99.9%
Bitumen soluble in carbon disulphide.....	99.9%
Loss on heating 5 hours at 325 degrees F.....	0.07%
Penetration at 77 degrees F. after above heating..	48

**Binder.**—The binder mixture was prepared from the following formula:

55 pounds asphalt cement,  
195 pounds sand,  
750 pounds crushed granite.

Analyses of samples of binder taken from the street gave the following high class mixture:

	Per Cent.
Bitumen .....	6.0
Passing 200-mesh .....	1.2
Passing 100-mesh .....	2.0
Passing 80-mesh .....	2.0
Passing 50-mesh .....	7.0
Passing 40-mesh .....	2.8
Passing 30-mesh .....	6.2
Passing 20-mesh .....	2.8
Passing 10-mesh .....	0.2
Passing 8-mesh .....	1.0
Passing 4-mesh .....	5.2
Passing 2-mesh .....	19.4
Passing ¾-mesh .....	12.8
Passing 1-mesh .....	31.4
	100.0

**Surface Mixture.**—The sheet asphalt surface mixture was prepared from the formula:

110 pounds asphalt cement,  
145 pounds limestone dust,  
745 pounds sand.

This mixture produced a surface of excellent quality, as the following analyses of samples taken from the street shows:

	Per Cent.
Bitumen .....	10.98
Passing 200-mesh .....	10.02
Passing 100-mesh .....	10.00
Passing 80-mesh .....	7.00
Passing 50-mesh .....	19.00
Passing 40-mesh .....	11.00
Passing 30-mesh .....	19.00
Passing 20-mesh .....	9.00
Passing 10-mesh .....	4.00
	100.00

The average amount of 1½-inch binder laid per box of 1,000 pounds was 6.7 square yards, and of 2-inch surface, 4.9 square yards.

#### PAVING COSTS BY FORCE ACCOUNT:

The following unit prices were paid for labor and material. (See top of next page.)

The following statement shows the actual cost and cost per square yard of the work complete.

It is seen from the above statement that the actual

Item.	Quantities.	Total cost.	Cost per square yard.
Grading	About 800 cubic yards	\$339.00	\$0.141
Concrete base material	334 cubic yards	1,446.00	.601
Concrete base labor	334 cubic yards	203.68	.085
Coal for concrete base	4 tons	13.60	.006
1½-inch binder	357 boxes of 1,000 pounds; 10 tons asphalt cement; 20 cubic yards sand; 140 tons stone	387.00	.161
2-inch surface	494 boxes of 1,000 pounds; 28 tons asphalt cement; 36 tons dust; 140 cubic yards sand	819.00	.341
Laying binder and surface, and rolling	3 rakers, 2 tampers and 15 laborers	112.93	.047
Hauling paving mixture from plant	6 wagons	89.55	.037
Coal at plant	24 tons	31.60	.034
Plant force	1 foreman, 1 watchman and 20 laborers	84.20	.035
General superintendence	20 days	160.00	.067
Interest and depreciation on plant and outfit	Cost, \$18,100	.....	.043
<b>Total</b>		<b>\$3,736.56</b>	<b>\$1.598</b>



cost of the work was about \$1.60 per square yard, which, it will be noted, included all grading.

#### Unit Prices for Labor and Material.

Labor.	Per Day.
Grading foreman .....	\$4.00
Concrete foreman .....	5.00
Plant foreman .....	5.00
Roller engineer .....	5.00
Stationary engineer .....	3.00
Rakers .....	2.50
	Per Hour.
Tampers .....	.12½
Laborers .....	.10
Wagon, team and driver .....	.45
Cart and driver .....	.25
Material (delivered)—	
Crushed granite .....	(per 2,000 pounds) \$1.50
Sand .....	(per cubic yard) .85
Asphalt .....	(per ton) 16.00
Limestone dust .....	(per ton) 7.00
Cement (less bags) .....	(per barrel) 2.10
Coal .....	(per ton) 3.40

The statement shows a charge of 4.3 cents per square yard for 5 per cent interest on cost of plant, and 10 cent depreciation in its value. The cost of plant and outfit suitable for this work would be about \$18,100, and the above charge per square yard was based on laying 58,700 square yards of paving, or two miles of street 50 feet in width, per year. Loss of time throughout the paving period, and overhead charges not included in the account, would slightly increase the above total cost per square yard when calculated on a yearly account basis.

Maintenance charges also should receive some consideration, but it is not expected that the above described street will require any repairs during the five-year guarantee period.

The general character of the streets paved with sheet asphalt is shown by the accompanying illustration, which is typical of the majority of our residence streets. The asphalt pavement on this street has a 1-inch surface, instead of the 2-inch laid on the business street referred to in the above analysis of costs, but otherwise the construction was the same. This street is 100 feet wide, the distance between curbs being 50 feet, and there being 25 feet between each curb and property line. Of the latter space, 6 feet is paved with concrete set 2 feet from the property line, and the remaining 17 feet is occupied by a line of trees and attractive lawns, while beds of flowers are added on some streets.

The curbs at the street intersections are rounded to a radius of 12 feet. At most intersections the storm water inlet is located in the center of the curve. The poles shown in the photograph are of concrete and carry high tension wires only, all other wires being underground.

Several residence streets are 150 feet wide. One of these recently paved for a length of a mile has a center parkway 40 feet wide, a 30-foot roadway on each side of this, and two 25-foot sidewalk spaces treated as in the street illustrated. This arrangement gives a very attractive street and one of which the city is justly proud.

## GRANITE BLOCK REPAVING IN WORCESTER

Made Necessary by Replacing of Steel Rails, Which It Had Outworn—Excellence of Grouting.

By CLARENCE D. POLLOCK, M. AM. Soc. C. E.\*

After fourteen years of service it became necessary to replace the street railway tracks in Main street, Worcester, Mass., during the past summer. The ties had rotted almost completely, and the granite pavement was all that held the rails. The rails had worn so much at some points and settled at others that in many places the car wheels actually ran on the granite blocks, which had retained their surface and neither settled nor worn down as fast as the rails. The pavement on Main street, including that in the tracks, was laid fourteen years ago, and was in practically perfect condition when the work of laying new track was begun in July of this year. (The work of repaving has just been completed.) During this long period nothing has been expended upon the pavement for maintenance for wear and tear, the only expenditures have been for replacing cuts in the pavement.

This Main street pavement was a smooth, grouted granite block pavement upon a concrete foundation. The whole of the work, both in the tracks and outside of them, was done by the city under Frederick A. McClure, the present city engineer. Mr. McClure was first connected with the Engineering Department of the city of Worcester forty-five years ago, and was the originator of Worcester's wonderfully successful grouted granite pavements. His object originally in grouting the blocks was to obviate the cutting away of the blocks at the joints by traffic and causing the blocks to assume a rounded form. While the Main street pavement was not the first grouted granite block pavement which Mr. McClure laid in Worcester, yet it was his first wholly satisfactory one.

The original pavement was laid upon a six-inch concrete foundation, with a sand cushion, the blocks being seven inches in depth. The blocks were cut with good heads and, after being carefully set, a sprinkling of pea-stone was placed in the joints, just sufficient to pin the bottoms of the blocks, and then the blocks were well rammed. Next a grout of one part of Portland cement to one part of sand was used. This grout was mixed to the consistency of thin cream, and then poured from iron buckets into the joints. After the joints were thoroughly filled, pea-stone was swept over the surface of the pavement, and some of it settled into the grout in the joints, as could be seen when the pavement was removed for the placing of the new tracks. Great care was taken to see that the grout was properly mixed and placed, and also to insure its thorough protection during the period of setting.

\*Consulting Engineer, New York City.



SHOWING THOROUGH GROUTING OF OLD BLOCKS, FLANGE SPACE FILLED WITH MORTAR, AND CONCRETE BASE.

The results showed how conscientiously the work was done. Throughout the entire length of the street it was found that the grout in the joints had penetrated to the bottom of the blocks or practically to that point in all cases. The grout in the bottom of the joints was found to be of just as good quality as that at the top of the joints. To this fact is largely due the great success of this pavement.

In the new track construction, untreated chestnut ties were used, spaced two feet apart on centers, and the rails were of the 9-inch grooved, girder type, weighing 125 pounds to the yard. The overhead feeder cables were placed underground during the reconstruction of the tracks. These cables were encased in concrete, and the concrete was brought up nearly to the bottom of the ties, so that there should be practically no settlement of the small amount of fill placed on top. The fill was of good gravelly material, and the ties were ballasted with gravel. A concrete base 6 inches in depth was placed between the ties, but not under them.

This concrete base was bonded with the old concrete in the sides of the street, except for an experimental stretch of about 500 feet in length, where bituminous expansion joints were placed both between the foundation concrete in the track and the concrete in the side roadways, and also in the granite pavement. In the foundation, the bituminous strip was placed at the outside end of the ties; in the pavement, it was inserted after one course of blocks had been paved parallel to and outside of the outer rail on either side of the street.

The idea of these expansion joints was to eliminate the rumbling noise made by the heavy interurban cars, which for some time had been considerable. This noise, however, unquestionably was due very largely to low places in the rails, which allowed the car wheels to strike upon the stone blocks, as before described. This expansion joint was employed only in one end of the work as an

experiment, and the disadvantage of having a continuous longitudinal joint in the pavement one course from the rail on each side of the street is likely to more than offset any hoped-for advantage. In addition to this, the single course of grouted granite blocks will probably be forced out from the rail by heavy traffic.

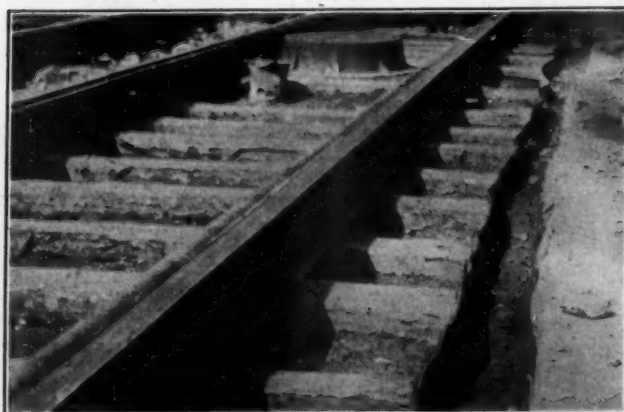
Great care was taken in chiseling out the toothing to secure a good connection with the pavement in the sides of the street, the breaking of joints at the juncture of the new and old pavements being in no case less than about 2½ inches. A small amount of pea-stone was sprinkled into the joints with shovels, barely enough to pin the bottoms of the blocks, after which the blocks were thoroughly rammed, precautions being taken to see that the new surface matched in with the adjacent surface of the old pavement. Then the joints were filled with cement grout mixed in the proportion of one part of Portland cement to one part of sand. The mixing of the grout was done by a gasoline mixer, the sand and cement being carefully measured in bags for each batch, and great uniformity was secured. Upon part of this work the grout was delivered directly from the mixer by means of a spout, but upon the balance the grout was discharged from the mixer into wheelbarrows and by these delivered on the work. Care was taken to see that the grout was not wheeled any great distance, as this would cause the sand to settle out and result in an uneven mixture.

When the joints had been filled flush with the top of the pavement, a small amount of pea-stone was sprinkled over the surface and broomed into the freshly grouted joints. Due to the great care exercised in the mixing of the grout to a uniform consistency and filling the joints practically to the full depth, no failures whatever have occurred in this work, either in the old or the new portion of the pavement.

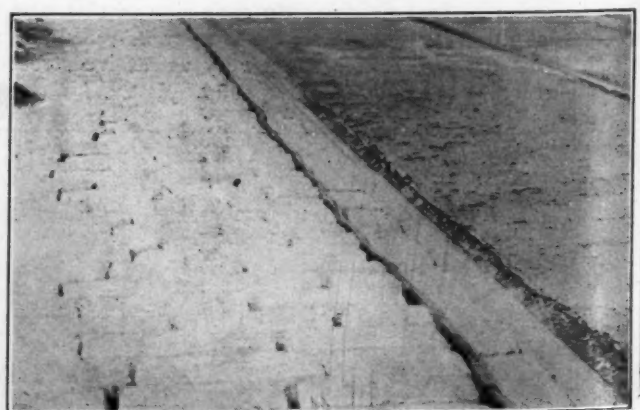
In many grouted granite block pavements sufficient care has not been taken in this matter of grouting and in consequence, where a lean mixture has been used in the bottom of the joints and a rich one in the top of the joints, or where the pea-stone has been allowed to nearly fill the joints in places, failures have resulted from the actual crushing of the blocks at such points. It has been shown, as a result of the careful examination of numerous pavements where the grouting generally has been well done, but in which there are some spots where there is good grout in only the upper inch or a little more of the joint, that the pressure from expansion of the pavement crushes the top of the block and leaves the bottom of the block intact. Nothing of this sort has occurred in any portion of the Main street pavement in Worcester, and this is most certainly due to the conscientious work



STONE BLOCKS REMOVED FROM OLD PAVEMENT IN A LARGE SLAB.



EXPANSION JOINT FILLER FOR FOUNDATION IN PLACE.



EXPANSION JOINT FILLER IN BLOCK PAVEMENT, SHOWING TOOTHING.



done in filling the joints uniformly full with good, evenly mixed grout.

The original paving of Main street was done in two sections, one costing \$2.973 per square yard, and the other \$3.377 per square yard. These figures include the grading, concrete and the pavement complete, together with the engineering. The difference was due to different traffic conditions to contend with, and variations in the cost of materials (the sections were done at different times), a very low sand price having been obtained on one portion and also a lower price on the blocks. The track pavement cost \$3.392 per square yard.

The following detailed figures of cost were obtained on a portion of the work when it was done fourteen years ago:

Grading—	Taking up the old blocks, etc.	\$0.265 per sq. yd.	
Concrete—	Labor	\$0.201	
	Stone	0.081	
	Cement	0.249	
	Sand	0.013	0.544 per sq. yd.
Block laying—	Labor	0.222	
	Teaming	0.011	
	Sand	0.014	
	Pea-stone	0.005	0.252 per sq. yd.
Grouting—	Labor	0.085	
	Cement	0.136	
	Sand	0.003	
	Pea-stone	0.006	0.230 per sq. yd.
Engineering—			0.011 per sq. yd.
Blocks—			1.60 per sq. yd.
Total—			\$2.902 per sq. yd.

The low cost of this portion was due to cheap sand, favorable traffic conditions, and the like.

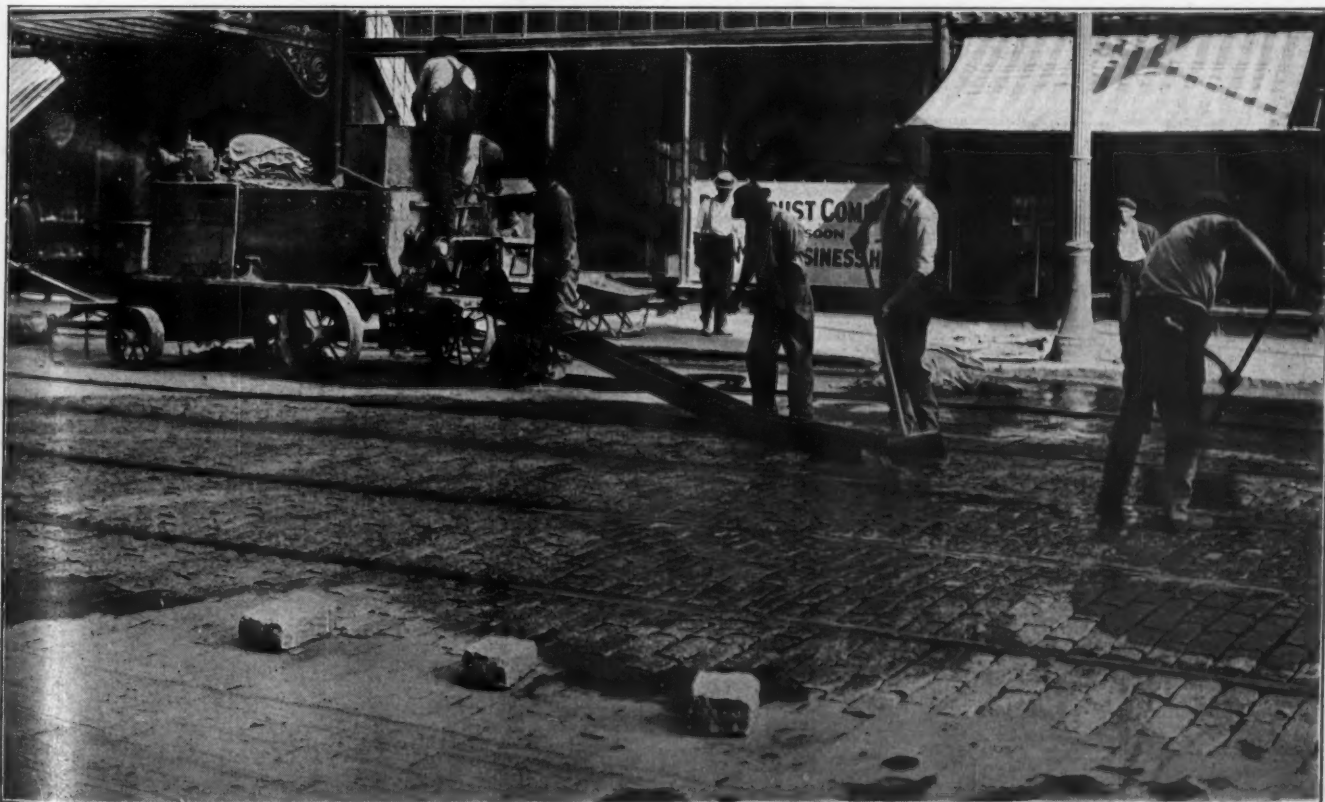
The cost of replacing the pavement this season, after the new tracks were installed, was not far from the average of the original work. This was a favorable year for doing the work, but the cost of chiseling out the toothing and similar items which did not enter into the original



CUTTING OUT TOOTHING IN OLD PAVEMENT.

work increased the present cost. The traction company furnished the materials for the pavement this time, and the city provided the labor and charged it to the company. About two-thirds of the old blocks were cleaned, at a cost of \$10 per thousand, and used in tracks on less important streets. All new blocks were used on Main street, as the city ordinances called for such to be provided. Blocks which were broken or damaged materially in removing the pavement were crushed and used for concrete stone, thus making a very substantial salvage even in the broken blocks, as after the cost of hauling and crushing was deducted there still remained a saving of about 80 cents per ton over new broken stone.

Great credit is due Frederick A. McClure, the present city engineer, for his thorough and conscientious work in laying the original pavement in such manner that it has cost nothing for maintenance in all this period, and for his success in replacing the pavement in the railway area after the laying of the new tracks so that it matches the surface of the old pavement so perfectly.



GROUTING PAVEMENT THROUGH TROUGH.  
Note Toothing of New Pavement With Old in the Foreground.

## GARBAGE DISPOSAL AT READING

Four Incinerator Units, Each Twenty-five Tons Capacity  
—Amount of Coal Used and Other Operating  
Costs—Collection Methods.

By W. C. MATTHIAS.\*

Prior to 1914 the garbage of the city of Reading, Pa., was collected and disposed of by contract. Refuse other than garbage was and still is collected by private parties or disposed of by the owners. The contractor for disposing of the garbage used a reduction method and installed for this purpose a plant in Cumru township, about three miles southwest of the city.

Before the termination of this contract the city authorities came to the conclusion that it would be advisable for the city to construct and equip its own plant. An investigation of the possibilities along this line were made, and early in 1914 a contract was entered into with Keller & Price of Lancaster, Pa., for the installation of two incinerating units, each having a capacity of 25 tons. The contract price for the two units was \$6,500, not including the building and stack, which were furnished by the city. Some months later another contract was made with the same parties for two additional units and a new stack, and these were completed in June of this year at a cost of \$9,500. The plant is located at Millmont, about two and a half miles from the center of the city and half a mile from the nearest residential part of the same.

The first two units have been in service for thirteen months and have proved very satisfactory. There are no perceptible odors from any part of the plant and only a very light yellow and green odorless smoke is emitted from the stack.

Fig. 2 shows a section drawing of the furnace. The garbage is dumped from the wagon through the feed pot

\*Chief of Bureau of Electricity, Department of Public Safety, Reading, Pa.

A into the storage chamber B, onto fire brick strainers C, through which the water passes to evaporator D. The solid part of the garbage remains on C until sufficiently dried out to be used as a fuel, when it is raked on to the fire grate E. All liquid matter or moisture in the garbage to be cremated, after percolating through the garbage strainers, passes to the flash evaporator arches F, where it is instantly reduced to an odorless gas, which material expedites cremation. Any overflow from the flash evaporator descends into the catch basin or combustion chamber G, where it is finally disposed of by evaporation caused by heat supplied down through the down-draft flues. This complete evaporation of the liquid matter makes unnecessary any sewer connections or draining to waterways. The chimney connected with the two furnaces first built is 100 feet high and the other chimney 125 feet high.

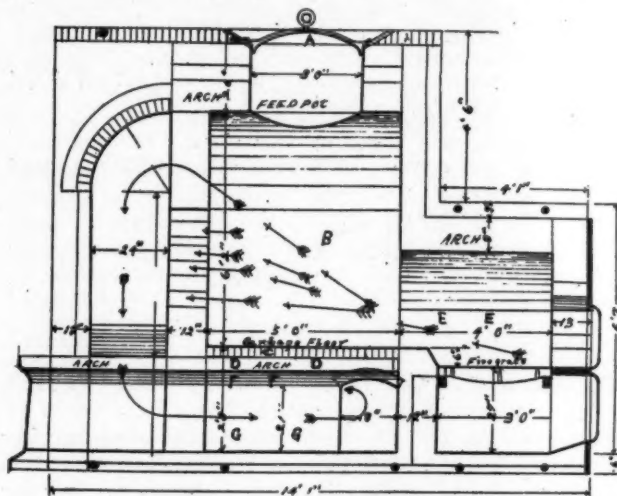


FIG. 2. LONGITUDINAL SECTION THROUGH INCINERATOR.

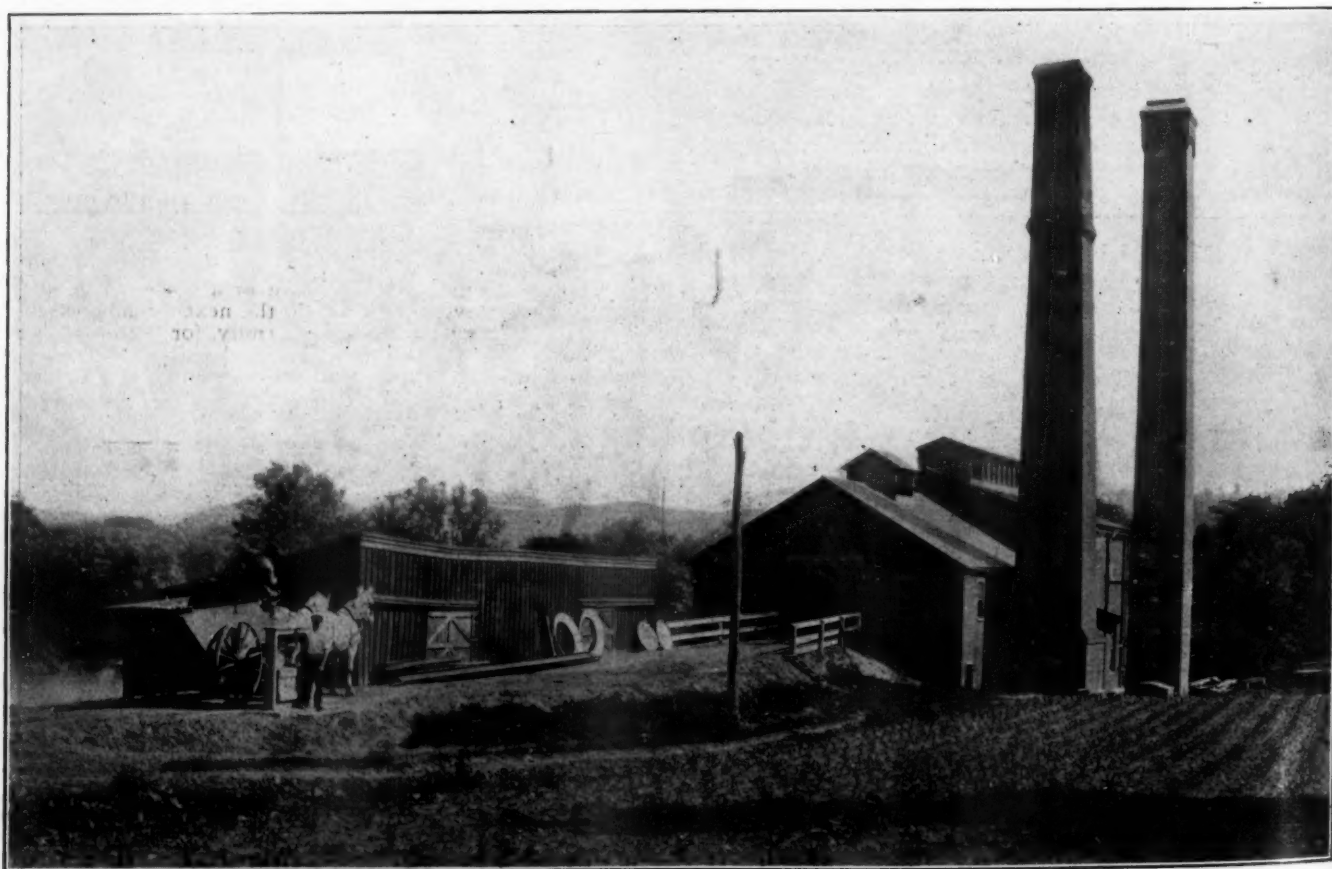


FIG. 1. READING, PA., GARBAGE INCINERATOR PLANT.



The gases, after passing through the arch, go directly to the chimney. The temperature of these gases on leaving chamber G has never been determined. The material burned consists of garbage only, comprising all sorts of vegetable, fruit and animal matter, tin cans, paper or other wrapping used for meats, fruits and vegetables. All of these materials are dumped into the feed pots, the covers (shown in Fig. 3) being removed from them to permit this.

The guaranteed total capacity of the plant is 100 tons per day. At the present time an average of 35 tons a day is being delivered to the plant. The contract requirements were that the furnace should dispose of all liquids without necessity of discharging any outside of the plant, that there should be no contamination of the atmosphere and that each unit should have a capacity of 25 tons a day. A test was made to determine that the plant satisfied these conditions, the garbage and coal used both being weighed. The first pair of furnaces have now been in operation for thirteen months and have required no repairs except a replacing of the grates.

The plant is operated in two shifts of eight hours each, with five men to a shift. The fire is allowed to go entirely out between shifts. At the present time one ton of coal is required for each ten tons of garbage. During the last nine months the cost of operation has been \$4,852 for labor, \$2,462.31 for coal, four sets of grates costing \$71.88 per set, \$118.85 for general repairs, \$24.87 for water service and \$44.76 for miscellaneous supplies. This gives a total of \$7,790.01. At present we are not deriving any profit from the plant, being satisfied with having a sanitary and odorless plant run at a very low cost. The cost of collection and delivering to the plant is \$1 per ton. We expect to derive a revenue from these furnaces in the future by utilizing the heat by passing it under and through the tubes of a boiler after it has performed its duty in the furnace, and the auxiliary power thus generated will be converted for the city's electrical use.

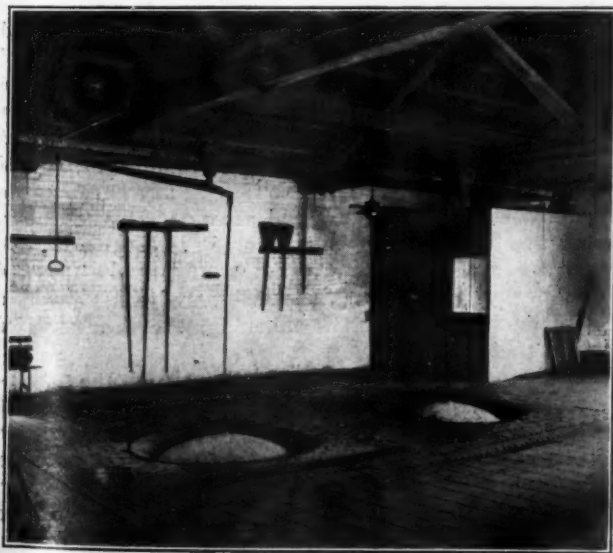


FIG. 3. CHARGING HOLES, READING GARBAGE INCINERATOR.

The specifications and contract for these incinerators were prepared by City Engineer Ulrich. The plant is under the supervision and direction of Peter S. Holl, superintendent of the Department of Public Safety of the city of Reading.

#### GARBAGE COLLECTION.

To facilitate collection, the city is divided into four districts. An average of twelve carts is used in collecting garbage and delivering it to the plant, varying from nine

in winter to fifteen or eighteen in summer. Each cart carries about two tons at a load. Two horses are used to a cart and each must make two loads for a day's work, for which the contractor receives \$3.88 per day per team. The city owns the wagons and keeps them in repair for ordinary usage, the contractor being held responsible for damage to wagons resulting from negligence of the drivers. The total amount of garbage collected last year was 10,110 tons which, taking 26 days for an average month, gives an average of 32.4 tons per day. As stated, the present average is about 35 tons.

The city requires by ordinance that each householder have a can with a capacity not exceeding one bushel which must be water-tight and tightly covered and must be placed at the curb for collection.

The wagons are made of sheet iron and have a capacity of about 80 cubic feet. They are furnished with canvas covers and each driver must cover his wagon on completion of a load.

Two inspectors are constantly employed on the streets to see that the drivers collect properly, to look into complaints and see that each district is completely cleaned up before nightfall. All garbage is collected by the city, none being collected by farmers or others.

## THE ANNUAL BUDGET

### The Three Essentials of a Budget—New Improvements Decide the Rate—How Baltimore Makes Up Its Budget.

By WILLIAM TALBOTT CHILDS.\*

The necessity of annual budgets has long since been recognized. The lead taken by municipalities in annual budget-making and the publicity given the subject are being followed, not only by the Federal and state governments, but by churches, clubs and all kinds of organizations which handle funds. Even private individuals have recognized the wisdom and necessity of adopting a budget system. One of the most important issues of the Maryland gubernatorial campaign of 1915 is the adoption by the state of a budget system.

#### THE A B C OF THE ANNUAL BUDGET.

It should not be difficult for any city or town to install an annual budget system. Briefly, an annual budget system comprehends three simple A B C essentials:

A.—An honest, intelligent estimate of all moneys to be expended by the government during the next ensuing fiscal year, preferably, for the sake of uniformity, for the calendar year. This includes contractual and fixed obligations, such as interest on the public debt and sinking fund reserves for

\*Deputy Comptroller of Baltimore, Md.

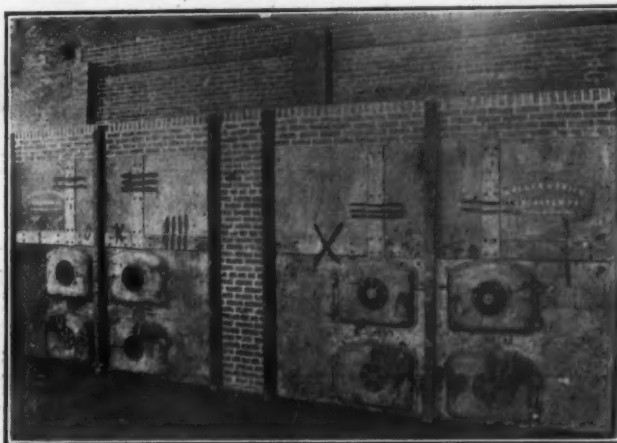


FIG. 4. FRONT VIEW OF GARBAGE INCINERATOR.

the retirement of loans at maturity, also estimates for general maintenance and necessary new improvements.

B.—An honest, intelligent estimate of the revenue that can be expected to be derived during the fiscal year from all sources other than taxation; such, for instance, as licenses, fees, franchises and special privileges.

C.—The fixing of a rate on taxable property that will produce revenue in a sum equivalent to the difference between A and B.

The experience of most cities that have adopted the budget system is that the estimates first made for "A" almost invariably make "C" prohibitive. Some items of "A," however, cannot be eliminated or reduced if the municipality wishes to maintain its financial integrity, such as contractual obligations, and interest and sinking fund charges on loans; also proper provision for a non-parsimonious governmental maintenance must be made. But the class of estimates that can usually stand elimination or reduction in sums sufficient to materially affect the tax rate is new improvements. "New improvements make the tax rate" is a coined expression of much significance. Here is where public officials often find themselves between the upper and the nether millstones. With demand by a certain element of the public for new improvements, coupled with the threat of political annihilation if not given, and demand by another certain element of the public for a low tax rate, likewise coupled with the threat of political annihilation if not given, this choosing between Scylla and Charybdis, with no midway island of safety, becomes extremely nerve-racking to say the least; but the conscientious public official who has but one master, Duty, soon finds a satisfactory way of making "A" conform with "C," or of making "C" conform with "A;" for usually "B" is not very elastic unless arbitrarily made so, as "high financiers" sometimes water stock. The problem of the annual budget is then settled for twelve months.

#### HOW BALTIMORE MAKES UP ITS ANNUAL BUDGET.

The preparation of "The Ordinance of Estimates," which is the title of Baltimore's annual budget, begins about the middle of August of each year, when seven sets of forms are sent to the department heads, chairmen of boards and others to whom appropriations of public funds are made. These forms, when properly filled up, set forth in detail the estimated amounts necessary for the maintenance of the city government for the next ensuing fiscal year, and also include estimates for new improvements recommended to be made during the year, as well as estimates for interest and sinking fund obligations on the public debt, and other contractual liabilities—in fact, the forms contain estimates of all public moneys to be disbursed during the year for any purpose whatsoever. The estimates are verified by oath or affirmation of the person making them, and a wilfully false statement made in a material matter contained in the estimates is perjury. The seven forms used are as follows:

- 1.—List No. 1, Departmental Estimates—Salaries.
- 2.—List No. 1, Departmental Estimates—Expenses.
- 3.—List No. 2, Estimates for New Improvements.
- 4.—List No. 3, Estimates for Annual Appropriations (for use of city departments).
- 5.—List No. 3, Estimates for Annual Appropriations (for use other than city departments).
- 6.—Summary sheet.
- 7.—Revenue estimates.

As an illustration, "Form No. 2—List No. 1, Departmental Estimates—Expenses" contains the following column headings: Quantity; article, material, labor, etc.; amount estimated for the year 1916—rate, total; amount appropriated for the year 1915—rate, total; increase; decrease; amount requested for 1915—rate, total; amount of 1915's appropriation expended to September 1; balance of 1915's appropriation on hand September 1; probable surplus of 1915's appropriation at the close of the year.

At the head of the form are the following instructions:

All estimates should be typewritten, the original and five copies being required. Arrange estimates in exact order of the "Detail of Appropriations" shown in "Appropriations" for the current year. Sign all sheets and make affidavit to original summary sheet only. Deliver original and five copies of all sheets to Secretary, Board of Estimates, Room 104, City Hall, before September 20th, 1915. The Board of Estimates will advise when public hearings will be held. All changes in salaries and expenses and all new improvements should be fully explained by separate letter (original and five copies) accompanying the estimates. Every department head makes oath as to correctness of Estimate.

The city charter of Baltimore requires that the Board of Estimates shall meet annually, between the first day of October and the first day of November, and, by an affirmative vote of a majority of the members, make out three lists of moneys to be appropriated by the city council for the next ensuing fiscal year, namely:

First—A detailed list, known as "List No. 1, Departmental Estimates," of the amounts estimated to be required to pay the expense of conducting the public business for the next ensuing fiscal year. The two grand divisions of this list are "Salaries" and "Expenses." "Salaries" includes the salaries of all city employees paid at a monthly rate. "Expenses" includes the general maintenance of the city government.

Second—A list, known as "List No. 2, Estimates for New Improvements," which contains all amounts to be appropriated, as the title implies, for new improvements which are to be constructed during the next ensuing fiscal year.

Third—A list, known as "List No. 3, Estimates for Annual Appropriations," which contains all amounts which, by previous laws, ordinances, or contracts, are required to be appropriated annually by the city to charities, or to educational, benevolent or reformatory institutions, as well as all other sums of moneys which may be required by laws or ordinances to be appropriated for other purposes not embraced in Lists Nos. 1 and 2.

When all the forms are delivered to the Board of Estimates, not later than September 20th, they are made up into books, a copy being made for each of the five members of the Board, and various summary and comparative statements are compiled of the total appropriations and receipts.

Experience has demonstrated that if the work stopped here the tax rate would be prohibitive. There must, of necessity, be many eliminations and reductions in the original estimates before final approval. Department heads, chairmen of commissions and boards, and others who submit estimates are summoned before the Board of Estimates to explain their requisitions. The hearings are held daily, except Saturday, and are open to the public. During the hearings each member of the Board of Estimates makes his own private notes, and at the close of the public hearings, executive sessions of the Board are held, when formal action is taken on the thousands of items in the estimates.

When all appropriations are finally agreed upon, tabulations are made of the same and of the revenue which the city expects to derive from the fixed or certain sources. These sources include the revenue estimated to be derived from taxation on securities, savings banks deposits and suburban and rural properties, and also from water rents, interest on deposits, liquor licenses, rentals, general licenses, franchises, wharfage, markets, the sale of city stock, etc. The total revenue thus estimated to be received is deducted from the total appropriations and the difference is the amount of money which has to be raised by taxation at the full rate.

The work now becomes a simple proposition in arithmetic—that is to say, the fixing of the tax rate. That is done by dividing the figures representing the amount of money to be raised by taxation at the full rate by the figures representing the city's assessable basis; or, to be more exact, such part of the assessable basis as is subject to the "full rate." To illustrate:



Estimated amount necessary for the maintenance of the city government for the year 1915, as appropriated by the ordinance of estimates for the year 1915..... \$23,791,502.64

Estimated receipts from licenses, fees, rents and all other charges, including the amount believed to be collectible from taxes in arrears, and also from taxes at fixed rates for the year 1915 ..... 16,377,231.43

Amount to be raised by taxation at full rate.. \$7,414,271.21

Estimating 85 per cent collectible on \$454,305,834, this representing property assessable at full rate, or \$386,159,959, the Board of Estimates, on November 25, 1914, stated a tax rate of \$1.92 per \$100 for the fiscal year 1915 would be necessary to produce the difference between the anticipated expenditures and receipts of the city, the product of the same being \$7,414,271.21.

When the Board of Estimates approves the ordinance of estimates, it is advertised in at least two daily newspapers in Baltimore city for two successive days, and immediately afterward is submitted to the city council, which meets in daily special session until the ordinance is passed, no other business being considered during the special session.

The city council may reduce or eliminate any items in the ordinance of estimates excepting contractual obligations, such as interest and sinking fund charges on the public debt, but the council cannot add a single item to the ordinance.

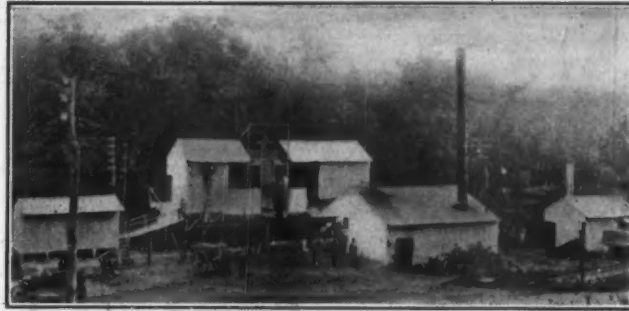
When the ordinance of estimates is passed by the council, a report is sent to the council by the Board of Estimates stating what tax rate is necessary to produce sufficient revenue for the appropriation contained in the ordinance of estimates.

## SURFACING THE BOSTON POST ROAD

### Resurfacing Old Oiled Macadam, Which was Scarified and Re-shaped—Transporting Material from Permanent Mixing Plant—Spreading and Rolling.

A section of the Boston Post Road, extending along Putnam Avenue in Greenwich, Conn., is being surfaced with the type of asphaltic concrete known as Amiesite, using the old oiled macadam road for the foundation. The Post Road, which is the main thoroughfare between New York with the country south and west of it, and New Haven, Boston and New England in general, carries very heavy traffic, the automobile movements averaging over 2,000 daily and rising to 5,000 or even 7,500 on Sundays and holidays. The strip now being treated is one of the few sections on this road between New York and New Haven not in first class condition. It is about 2,000 feet long and the pavement is 21 feet wide.

In preparing the foundation and subgrade, the oiled top of the old road, which was an oiled macadam, was removed and the road itself scarified and thoroughly broken up. This was necessary as the surface was badly rutted and full of holes and the crown worn practically flat. Shaping and grading were done by pick and shovel, a crown slightly over  $\frac{1}{4}$ -inch per foot being used and the top of the road being brought to a grade two inches below that of the finished surface, although a  $2\frac{1}{2}$ -inch surfacing was to be used. The usual practice in laying Amiesite is to leave the finished surface  $\frac{1}{2}$ -inch too high, as it compacts gradually under traffic. A very firm foundation was secured from the old road, the oil from the former treatment causing it to pack solidly under the roller.



PLANT AT PLAINVILLE, CONNECTICUT.

The Amiesite, which is an asphaltic concrete so treated that it may be laid cold, or even stored for long periods before laying, is manufactured for this work at a permanent plant at Plainville, Conn., nearly 100 miles away, and is shipped in steel gondola cars to Greenwich, where it is unloaded as needed and hauled to the job.

At the Plainville plant, the cars are run on a spur track directly under the mixer, which discharges into them. At Greenwich the cars are unloaded by hand. Usually four men are assigned to each car, one or two working with picks or bars loosening the Amiesite, which is caked and rather solid after the long trip in the open cars; the other men with stone forks filling the wagons, which are driven alongside the cars. From 10 to 15 minutes are required to fill a  $1\frac{1}{2}$ -yard wagon, the time depending on the consistency and condition of the Amiesite, the amount left in the car, etc.

Local teams are hired at \$6 per day to do the hauling from the station to the work, a distance of about one mile, most of which is up-grade. The time required to make a round trip, including loading, unloading and traffic delays, is generally about one hour.

The material is dumped on platforms or directly on the sub-grade, which has previously been swept clean of dust and dirt. The spreading gang, composed of a foreman, a pick man and eleven or twelve men with forks, then spread the material evenly over the sub-grade to a depth of  $2\frac{1}{2}$  inches. The material handles easily with the forks, though occasionally the pick man is called upon to break a clod or lump. After spreading, it is raked over to insure proper leveling and rolled slightly with a Kelly-Springfield ten-ton roller.

This bottom coat is composed of asphalt-covered stone



LAYING AND SPREADING SURFACE MATERIAL.



LOADING PAVING MATERIAL FROM CAR TO WAGON.

ranging in size from  $1\frac{1}{2}$ -inch to  $\frac{3}{4}$ -inch. The wearing coat, which is laid 1 inch thick, is composed of stone ranging from  $\frac{5}{8}$ -inch down. This coat is laid in the same manner as the foundation course, but is thoroughly rolled, starting at the sides and working toward the center. The finished thickness of the completed surface is  $2\frac{1}{2}$  inches, the top course compressing and sinking into the lightly rolled bottom course. When the surface no longer moves or creeps under the roller, it is given a light coat of clean sharp sand and thrown open to traffic.

At present the work is going on at the rate of about 500 square yards per day. The contractor is Charles T. Eastburn Co., of Mt. Vernon, N. Y., of which William Halton is general manager.

#### SEPTIC TANK PATENT DECISION.

The Cameron Septic Tank Company some months ago brought suit for infringement of its patent against Winchester, Kentucky, a city of about 8,000 population. In defense, the city entered a plea that the patent of the company had expired, because it was identical with the British septic tank patent, which expired some years ago; and the U. S. Supreme Court had held, in the Knoxville case, that, by the Treaty of Brussels, the life of the United States patent did terminate with that of the British patent.

The company, in replication to this plea, claimed that in the Knoxville suit it stipulated, for the purpose of expediting an appeal to the Supreme Court, that the allegation of identity between the United States and the British patent might be taken as true; that the question of such identity was not before the court, and comes up for the first time in this Winchester suit; and that it now denies such identity, claiming that the British patent was for an apparatus, while they were suing Winchester on only the process claims of the United States patent (the apparatus claims had been declared invalid in the Saratoga suit).

Winchester offered no proof in support of its plea of expiration of the patent, and the District Court sustains the company's replication of the city's plea and orders the plea disallowed. This, of course, has no bearing upon the question of infringement, which still remains before the court.

#### UNIFORMITY IN STATISTICS OF CITIES.

The possibilities of cooperation between the National Government and the cities of the country in producing statistics of value to both, are illustrated in the annual report of the comptroller of Baltimore for 1914, just issued.

The United States Bureau of the Census has established uniform municipal-expenditure classifications in publishing its statistics of cities, and these classifications have been adopted by the Baltimore comptroller in making his report for the year. The Maryland city has in this respect coincided with the same course that has been adopted by Knoxville, Tenn., in its financial reports, and in following

the lead of the United States Government such cities are laying the foundation for a uniform accounting system which promises exceptional opportunities to make the work of the municipal departments contribute to the growing store of facts relating to cities gathered by the United States Government.

It is pointed out by the Bureau of the Census that if all the cities adopted the uniform classifications the combined results would constitute a census of the country in this class of statistics, produced simply by combining the official annual reports of all the cities. This would mean prompt, frequent, and economical gathering of such facts.

The Baltimore report states, in explanation of the work done, that its summary of the budgetary statement of the finances of all departments of the city for 1914 is "classified under the 10 various functions of city government in accordance with the uniform municipal-expenditure classifications of the United States Bureau of the Census, as published in 'Statistics of Cities.'"—From Report of Department of Commerce.

#### LAYING DURAX PAVEMENT IN DAYTON.

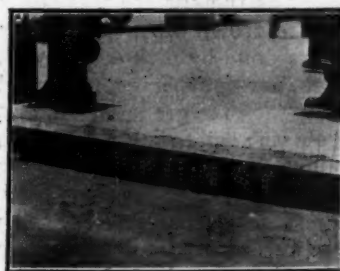
In laying durax pavement, the blocks may be laid in straight lines or in intersecting arcs, the latter being the method employed in the original durax and preferred by most of those in this country which have tried both. In laying the intersecting arcs, difficulty is found in securing uniform arcs and good appearance unless men can be obtained who have had experience in the work. To furnish a guide to the block-layers, John E. Ramsey, consulting engineer, of Salisbury, N. C., has recommended a scheme of using grade stakes for the work at the intersection of Second and Ludlow streets, Dayton, O.

The plan is to drive grade stakes at 4-foot intervals on lines transverse of the roadway and ten feet apart. A template is furnished in the shape of the arc of a circle, the radius being 2 ft. 10 in. and the chord 4 ft. This template is set with each end at a grade stake, and the stones laid along the arc. The succeeding courses are set parallel to this, and the shape of the arc checked up ten feet ahead when the next grade stakes are reached. Meantime strings are stretched occasionally from stake to stake parallel to the curb to check up the alignment of the ends of the arcs and also the grade of the pavement.

To make it possible to drive the grade stakes, iron pins  $\frac{3}{8}$  in. by 10 in. are driven into the concrete while it is green, and the holes so made are plugged with wood. When the concrete has set and paving is to begin, grade stakes are driven through the plugged holes.

#### STREET SIGNS ON CURBS.

A system of electrically illuminated street signs of unique design is being tried out in San Francisco. The photograph shows one at the corner of Stockton and Geary streets. The sign is made of heavy glass lenses set in a massive iron container which is set flush with the curbstone both ways. Within the metal case are a



STREET SIGN ON CURB.

number of incandescent bulbs that are switched on at nightfall. The lettering shows distinctly by day and, by its position at the curb, is readily found by pedestrian and driver alike. But by night it is even more conspicuous, as the letters are formed of points of light.



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OCTOBER 7, 1915.

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## Electrolytic Sewage Treatment.

We give space in this issue to a rather full abstract of a report on electrolytic sewage purification which has just been made public, because a working plant of this general type has never before, we believe, been investigated and reported upon by experts who are generally recognized as having such high standing professionally as has Prof. Wm. P. Mason, who cooperated in this investigation.

New devices and methods for utilizing electricity in sewage purification have been advocated from time to time since the Webster process came into prominence about twenty-five years ago. A few installations have been made in this country during the past ten years, as described in Municipal Journal for December 16, 1908; April 28, 1909; February 8, 1911, and February 8, 1912, but none of these has been tested and reported upon by acknowledged experts, if we except Mr. Fuller's report on the Louisville experimental plant in 1896. This latest test and report is, therefore, of unusual importance.

The report presents numerous figures of chemical, bacteriological and physical analyses, and states, as deductions from these, that use of the process and apparatus described produces an effluent and a sludge which are remarkably stable and productive of no nuisance; that the

plant itself gives off no odors, and that it occupies a very small space. Cost it recognizes as being a vital point, and an estimate is given for New York conditions which places the cost at more than \$20 per million gallons; but it should be noted that this is based on a much higher cost of current and labor, and possibly of lime, than would prevail in most cities, and it is only about one-third what purification at the same plant has cost heretofore. The investigators conclude by recommending the process for use under certain conditions which would compensate for possible higher cost of operation than that by other processes available.

## Statistics of Cities.

All civilized governments have for years recognized the value, the almost necessity, of statistics concerning the numbers, conditions and activities of its citizens, and all spend considerable sums in compiling and studying these. As to the results obtained, however, the United States is greatly surpassed by European countries. This is partly due to the failure of our legislators to realize the importance of such information; but more, probably, to the lack of authority in the federal government to enforce and regulate the compiling of statistics by states and cities. The result is that, even in the matter of births and deaths, reliable figures are available for less than one-fourth of the country; and for finances and civic enterprises there are no comparable and reliable figures. To furnish such, it will be necessary that states, cities and other political units adopt uniform and scientifically devised forms on which to keep and report the data.

The Census Bureau has prepared a set of forms for this purpose, which it endeavors to fill in for each city at intervals of one to ten years. But in doing so it must take such figures as the cities furnish; it can not compel them to collect any given data or to classify them in any prescribed way. The result can not fail to be confusion and uncertainty, and a greatly diminished value of the statistics.

The only solution appears to be the voluntary adoption by the cities themselves of the standard forms recommended by the Census Bureau. This has been done by Knoxville, Tenn., and Baltimore, Md., and possibly by a few others. It should be done by every city. If any city thinks the form could be improved upon, the census officials will be glad to consider suggestions. But universally uniform reports on an imperfect form would be of much greater value than the present confusion of statistics, even assuming (which we cannot) that most of the forms now used are better than the census forms recommended.

## How Large Is a Piece of Chalk?

What is a square yard of pavement? What is meant by cleaning a street by hand sweeping? What is included in "constructing one foot of 12-inch sewer"? These and many similar terms and expressions, as used by different cities, are as indefinite as that well-known unit of size, "a piece of chalk." Even more fundamentally necessary than uniform methods of keeping records is the use by all cities of units of measurement and of comparison with uniform, definite meanings.

Cleaning a certain street by machine sweepers during 1914 is reported to have cost 30 cents per thousand square yards. That looks definite on the face of it, but is it? In the first place, does it mean that this was the cost each time the sweeper went over one thousand square yards, or the total annual cost per thousand square yards of pavement kept clean? Does it include the sweeping of the winrows of dirt into piles and removing it? And how far is it removed? And does it include the cost of re-

newing broom fiber and making repairs on the machine, the maintenance of the horses and a depreciation or renewal fund for both machinery and horses? And does it include salary of superintendent and other overhead expenses, cost of water used for sprinkling, etc.? It is absurd to compare the costs given by two cities, one of which includes all these items, while the other gives only the wages of the men employed in the machine sweeping gang.

This same uncertainty is found in every branch of municipal work, and gives an indefiniteness to every statement made concerning such work. This subject the Census Bureau has not, we believe, paid any considerable attention to. It has, in its publications, defined quite definitely the terms used in financial records of municipalities, but not in the physical records.

This important work is being undertaken by a committee of the American Society of Municipal Improvements. So far the committee has not made any startling progress, although it has recommended a number of the most important and easily defined units, such as square yard of paving (to be limited to the pavement only, and not to include excavation, curb or any other street work); foot of sewer construction (to be classified as to depth of trench, and exclude Y branches, manholes, rock excavation or any work not involved in each length of sewer so laid in any trench). It is to be hoped that this committee will add considerably to the list in the near future, and especially that it will endeavor to secure the most widespread information concerning the units and definitions adopted by the society at its recommendation, and general adoption of them by all cities.

## DYE FOR MEASURING SEWAGE FLOW

### Demonstration That Rate of Flow of Sewage Through Tanks Can Be Made Reliably by the Use of Certain Dyes—Diffusion of Color.

By FRANCIS E. DANIELS, A.M.\*

In the operation of sewage settling tanks it is often desirable to know just how rapidly the flow is actually passing through, irrespective of the theoretical time of detention figured on the total capacity of the tank and the amount of sewage entering in a given time. To make a quick test, a strong dye is often placed in the flow at the inlet, and the time it takes to make its appearance at the outlet is noted. This apparently gives the actual time it takes at least a portion of the sewage to travel from inlet to outlet; but on numerous occasions doubts have been expressed to the effect that the dye test was worthless, because it was believed that the diffusion of the dye in the water caused it to spread, so that it actually went faster than the water moved and therefore reached the outlet ahead of the particles of water which started at the inlet when the dye was introduced. It is rather discouraging to put dye in the inlet of a tank with a three or four hour theoretical storage capacity, and have the dye appear at the outlet in twenty or thirty minutes, and yet this is quite common.

The subject of the diffusion of one solution into another was investigated by Graham in 1851, who ascertained that the amount of diffusion of one solution into another was dependent upon time, strength of solution, temperature, character of the solvent and the coefficient of the substance. In 1855 Fick expanded Graham's work and published what is known as Fick's Law of Diffusion, by which it is possible to calculate the amount of one substance diffusing into another in a given time, provided the coefficient of diffusion of the substance be

known for the given conditions. In general, the diffusion of one substance into another is very slow, although the relative rates vary considerably. Hydrochloric acid, for instance, diffuses nearly one hundred times faster than caramel, under the same conditions.

In order to show that the actual visible diffusion of the dye has practically nothing to do with the time of transmission through tanks, the writer devised a simple experiment to determine a few curves of diffusion of the dye known as uranine, the dye usually employed in testing tanks and flows. Uranine is the alkali salt of fluorescein, and the sodium salt has the formula  $C_{20}H_{12}O_5Na$ . This is the one generally employed, although in the present experiment the potassium salt also was used. These dyes in concentrated solution give a very deep red color, but when diluted they become a vivid green and are easily seen in very minute quantities. This, together with the fact that they are not precipitated or decolorized, makes them exceptionally valuable for testing out cesspools, sink drains and sewers.

In the present experiments a 10 per cent solution of each dye was made, by weighing out 5 grams of the dye and dissolving in 45 c.c. of water. While both solutions were of a very deep red color, the potassium salt solution was not so deep in color as the sodium salt. This was due partly to difference in molecular weight and partly to moisture in the powder. The rate of the diffusion of this solution into water was somewhat slower than that of the sodium salt.

The experiments were carried out by means of a simple apparatus, devised and made by the writer for the occasion. A piece of capillary glass tubing about a foot long was sealed on to a short piece of glass tubing one-half inch in diameter. The end of the larger tube was closed, thus forming a reservoir about two inches long by one-half inch in diameter, communicating directly with the end of the capillary. A hole was blown into the top of the reservoir for easily admitting the water or dye.

To use the apparatus, the capillary is filled with water and two globules of mercury, acting as seals, one "A" at the end next to the reservoir, and the other, "B," about six or eight inches further back. The reservoir is then dried out with a strip of blotting paper and filled with the solution of dye. A slight pressure on a piece of rubber tubing placed over the free end of the capillary tube moves the column of water and seals, and the instant the mercury seal "A" rolls into the reservoir the dye solution comes in contact with the water. The exact position of the junction of dye and water is quickly marked on the tube with a wax pencil and the stop watch started. The distances the color travels in successive intervals of time are recorded and plotted.

As a check upon possible movements of the column of water, a mark is placed on the tube at the end of the mercury seal "B." It was found that the column did not move if the free end of the capillary was left open.

The diagram in Fig. 2 shows the rate of color diffusion of a 10 per cent solution of sodium uranine into tap water, at a temperature of between 78° and 80° F., there being no way to control the temperature of the room at the time of the experiment. Under these conditions it will be seen that a travel of only four and one-half inches occurred in fourteen hours. Several other experiments were made with weaker solutions and at lower temperatures, which gave much slower rates, and a solution diluted so that it just began to show green, required forty-eight hours to diffuse only two inches.

The author believes that by the above experiment he has demonstrated that tests of the flow of sewage through tanks can be made reliably by use of certain dyes. And although dyes are very easily mixed and scattered by disturbances in the water, they nevertheless serve a useful

\*Director of Water and Sewerage Inspections, New Jersey State Department of Health.



purpose in showing up short circuits through settling tanks. Of course, should some dye show at the outlet in a very short time, it does not necessarily follow that the whole flow is passing through at that maximum rate, but certainly the nearer the time of the appearance of the dye approaches to the storage time based on the cubical contents of the tank, the more even will be the flow.

The application of the dye test to sewage tanks shows so many to have short circuits that the writer believes that more consideration should be given to the design of tanks and baffles to produce a more uniform flow than is now the general practice. He does not believe the distribution over an inlet weir alone is satisfactory, nor does the collecting weir seem to be adequate. These matters should be the subject of considerable experimentation and such modification made in the design and arrangement of baffles that an even flow without short circuits will be maintained at all times. When this is done, the dye test will be valuable in determining the fluctuations in rates due to both variations in flow and changes in capacity caused by accumulations of deposited sludge.

## ELECTROLYTIC SEWAGE TREATMENT

### Tests Made by Experts of High Standing on the Work of a Plant Treating 750,000 Gallons a Day—Results and Cost of Operation.

Electrolytic sewage treatment has been under observation and test for eighteen months at the sewage disposal plant at Elmhurst, Borough of Queens, New York City. At first a small electrolytic plant was used, not designed originally for sewage and having a capacity of only 25,000 gallons per day. This plant and the results obtained by it were described in Municipal Journal for October 15, 1914.

Early in 1915 an apparatus of 500,000 gallons nominal capacity and designed for sewage treatment was installed at the same sewage disposal plant, and has been under operation since March. The promoters of this process, the Electro-Chemical Corporation, employed W. P. Mason, professor of chemistry at Rensselaer Polytechnic Institute, J. C. Olsen and C. O. Mailloux to test it thoroughly. As the plant was on city property, using city employees, etc., P. M. Travis, chemist of Queens Borough, cooperated with these in making the test. The investigation was made during April, May, June and July, and the report based thereon has just been made public by the city. This report contains numerous tables and other data obtained which are too extensive to give here in detail, but only the average figures and conclusions of the investigators will be given.

The following were assumed as criteria of the relative merits and value of this and other processes:

(a) The efficacy or adequacy of the particular method, process, apparatus or plant investigated, considered from the standpoint of sewage purification actually accomplished, i. e., considering the ability of the particular method or process to purify sewage to a practical and satisfactory degree, irrespective of the cost of doing the work.

(b) The cost of operation and service-giving results which may fairly be considered effective and satisfactory.

(c) The strong and weak points of the method or process.

(d) The range of adaptability and applicability of the method or process to different local conditions.

(e) The industrial and commercial practicability of the method or process in the particular case, and also in the general case.

The process consists of screening the sewage; electro-



FIG. 1.—APPARATUS FOR OBSERVING HORIZONTAL COLOR DIFFUSION OF DYE INTO WATER.

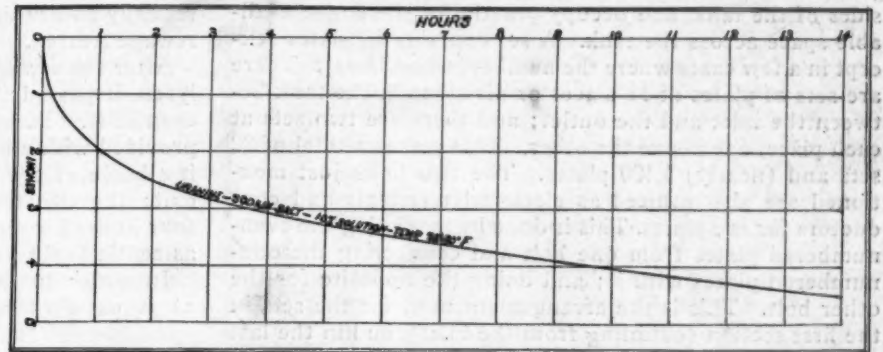


FIG. 2.—CURVE SHOWING RATE OF HORIZONTAL COLOR DIFFUSION OF A 10% SOLUTION OF URANINE INTO WATER AT A TEMPERATURE OF 78° TO 80° F.

lytic treatment with the addition of lime; sedimentation, and filter pressing of the sludge. Only the second operation differs from those carried on at several other disposal plants. The electrolytic treatment consists of subjecting the sewage to the action of electric currents suitable for producing electrolysis in the sewage, lime being introduced into the sewage, and the latter being agitated to reduce the amount of polarization caused by electrolysis, to keep the active surfaces of the electrodes clear of deposits and obstructions of solid matter, and to mix the sewage and lime rapidly and completely.

The apparatus consists of a wooden box, 23¼ feet in length and 3 feet in width and 2¾ feet in depth, resting upon a masonry foundation, and provided with a tight-fitting cover held down by bolts; the sides, top and bottom of the tank being stiffened by angle irons. The sewage inlet of the apparatus is at one end, and the outlet is at the other.

The sewage to be treated is passed through the apparatus by a pump which takes it from the receiving well and delivers it to the inlet end of the apparatus. In passing from the inlet to the outlet of the apparatus, the sewage flows between numerous iron plates, which are placed parallel and close to each other inside the closed box; consequently the liquid does not flow in one mass, but is subdivided into a large number of relatively thin sheets. The plates which separate these sheets of sewage from each other also serve as electrical conductors or "electrodes" by means of which electrical currents capable of producing electrolysis are conveyed across the liquid sheets, through the sewage, with the result that one side of each liquid sheet is in contact with an anode surface and the other with a cathode surface. To insure thorough agitation of the sewage as it flows in the spaces between the electrode plates, mechanical stirrers, in the form of paddles of a non-conducting material placed between these plates, are rotated in the planes of the liquid sheets.

The plates inside the apparatus are all in vertical planes, parallel with the sides of the tank, so that the liquid sheets of flow between the plates are all vertical. These liquid sheets are not continuous from the inlet to the outlet ends of the apparatus, because the plates are arranged in groups with spaces left between them.

The iron plates are all of the following dimensions: length, 16 inches; height, 10 inches; thickness, about 3-16 inch. They are grouped and assembled in sets, like the

plates for an "element" or cell of a storage battery. The plates in each group are all parallel to each other, and they have approximately equal spaces between them (5-16 inch to 3-8 inch). They are held together by bolts, which pass through all the plates, and through the insulating separators between them, and clamp them into a solid unit. When the sets of plates are in position in the tank, these bolts extend across the tank horizontally and support the plates which are then all in a vertical position, parallel with the sides of the tank, and occupy practically the entire available space across the tank. A set contains 50 plates (except in a few cases where the number is 1 or 2 less). There are sets of plates at 11 places or divisions in the tank between the inlet and the outlet; and there are two sets at each place, one above the other. This makes a total of 22 sets and (nearly) 1,100 plates. The two bolts just mentioned are also utilized as electrical terminals and conductors for the plates. This is done by insulating the even-numbered plates from one bolt and connecting the odd-numbered plates with it; and doing the opposite for the other bolt. This is the arrangement used for the sets in the first section (counting from the inlet), and in the last six sections, or for a total of 14 sets. In these sets, the plates constitute, in each case, an "electrolyzing element" of 25 pairs of plates. In the other 4 divisions the arrangement is less simple. The 50 plates of each set are not electrically grouped and connected into a single element of 25 pairs of plates, but into three elements, each of eight pairs (or more), which are connected in series. It follows that the total number of elements in these four sections is 24 (i. e., 12 for the 4 upper sets, and 12 for the 4 lower sets). Adding these to the 14 elements in the other divisions, the total is 38 elements.

In most of the tests the 38 elements were all connected in a simple series; in one test the 19 elements in the upper tier were connected by themselves in series, and likewise the 19 elements in the lower tier; and the two series were then connected in multiple. Various other combinations of series and multiple connection may be made, and were used in some of the tests. As the electrical connections between the sets of plates are made outside of the closed box, these combinations could be made easily. A watt-hour meter was specially connected in the mains between the D. C. generator and the switchboard.

Through each set of plates pass two shafts, each carrying a paddle in each space between plates, or 98 paddles to each group of plates, or a total of 2,156 paddles. The paddle-shafts are driven by bevel gearing from four horizontal shafts outside the tank, which in turn are driven by a 3 h. p. induction motor. The paddles revolved 18 to 19 r. p. m. during the tests.

Milk of lime was prepared by mixing quicklime or hydrated lime with water in a vat. It was introduced into the sewage under pressure at the inlet of the electrolytic machine; or, as an experiment, at the outlet, or at the inlet of the pump.

In operation, the polarity of the current was reversed hourly to equalize any chemical action on the electrodes and prevent deposits there. In normal operation, with the 38 elements connected in simple series, the current was maintained at about 30 amperes. The voltage per element varies appreciably from time to time, owing to deposits on the plates and chains and bridges of solid matter forming between plates of opposite polarity. The total quantity of current is equal, theoretically, to the product of the number of elements connected in series by the current in amperes passing through the series. Thus, with a current of 30 amperes passing through the 38 elements in series, the total quantity of current would be 1,140 amperes, assuming no leakage or short circuiting.

The time of flow of sewage through the apparatus was determined by injecting a coloring substance into the

liquid at some point ahead of the inlet and noting when it appeared at the outlet of the apparatus. Allowing for time of flow before reaching and after leaving the electrodes, it was found that about one minute was required for the sewage to pass through the electrodes when operated at the rate of 765,000 gallons per day. This would give 116 coulombs per gallon, allowing 10 per cent leakage of current. In the tests made, the current ranged between 85 and 169 coulombs per gallon, sufficient theoretically to liberate 1.21 to 2.31 c.c. of oxygen per liter of sewage treated.

After the sewage had been dosed with lime and electrolyzed, it passed through a flume into two settling tanks, each 82 ft. 6 in. by 20 ft. 3 in. with 65,000 gallons capacity, provided with a bottom baffle at the middle, a deep hanging baffle at the entrance and a skimming baffle at the exit; the two tanks being used in series, giving about four hours for sedimentation. These were the tanks used as septic tanks in the old plant.

In order to determine what happens to the sewage as it passes through the machine during the normal operation of the electrolytic process, certain data and information were procured. Samples of sewage for making chemical and bacteriological examinations were procured showing the condition of the sewage both before and after its passage through the machine, and also after the treated sewage had been allowed to remain in the sedimentation tanks; measurements of the volume and concentration of the milk of lime introduced into the sewage were made to determine the quantity and proportion of lime actually employed; and measurements were made of the electrical power and energy consumed in electrolyzing the sewage passing through the machine, the rate and quantity of flow of sewage through the machine being at the same time measured by the Venturi meter in use at the plant.

The principal results of the tests are given in tabular form in each case.

In the first series of experiments (tests No. 1-5) the machine was operated under what may be termed normal conditions. Lime was introduced into the sewage before passing through the machine in quantities equal to from 1,000 to 1,300 pounds of hydrated lime (about 73 per cent CaO) per million gallons which is equivalent to  $7\frac{1}{2}$  to  $9\frac{1}{2}$  grains per gallon. The quantity of lime used was ascertained by the tank being filled with milk of lime of known strength. Titrations were also made of the effluent to ascertain the amount of calcium oxide present in excess over that required to re-act with the dissolved carbonic acid and the alkalinity of the sewage.

#### Summary of All Analyses Taken at the Elmhurst Plant.

	Raw sewage.	Effluent from elec- trolyzing apparatus.	Effluent after four hours' sedi- mentation.
Nitrogen as nitrites....	0	.84	.17
Nitrates .....	.05	2.22	3.7
Free ammonia.....	26.5	20.0	13.6
Total organic nitrogen.	13.8	9.2	5.5
Oxygen dissolved.....	1.62	2.83	3.94
Per cent of saturation.	13.95	26.59	39.29
Consumed .....	40.08	36.4	20.7
Turbidity .....	41	27	7.2
Color .....	47	37	19
Chlorine .....	67.6	71.2	70.5
Carbon dioxide .....	20.02	0	0
Calcium oxide .....	0	128.3	82.6
Alkalinity .....	295.01	174.4	72.7
Calcium carbonate ....		294.8	127.7
Bacteria count by agar..	277,950	46,256.5	471

With the object of comparing the results obtained when electrolyzation was discontinued, i. e., when the sewage was treated with lime, but not electrolyzed, the machine was stopped at the end of a test on May 26th (at 2:55



P. M.) and arrangements made for tests without electrolysis. Comparing these results with the previous ones, it was learned that electrolyzing sewage gave a lighter-colored effluent and materially increased the amount of flocculation and precipitation of suspended matter, probably because the current tends to agglutinate the colloidal particles. Also 60 per cent total organic nitrogen was removed as compared to 11 per cent with lime alone.

The sewage was also treated with lime without electrolyzation, followed by application of hypochlorite. This is referred to in the final discussion.

In calculating the cost of the process, the cost of electrical current was taken as 4 cents per kw. h., the price paid by the city, which is much higher than could be obtained in many places. The estimate of amount of lime is based on that actually used, and the price is the present price at the plant in carload lots. The labor item is largely estimated, because much more was used during the tests than would be necessary. The chief labor required is for regulating sewage flow, keeping records, cleaning screens, dumping lime into lime vats, filter pressing (which might not be necessary) and cleaning tanks. \$1.00 per million gallons is allowed for maintenance, supplies and sundries, the principal item being renewal of iron electrode plates. In some cases the sludge (which is inoffensive) might be run onto low land, and the sludge disposal item eliminated. The estimated cost is as follows:

#### Estimated Cost of Electrolytic Purification of Sewage at Elmhurst.

	1,000,000- gal. unit.	3,000,000- gal. unit.
Lime, 1,300 lbs., at \$7.90 per ton	\$5.14	\$15.42
Electricity for electrolysis, 85 kilowatt hours, at 4 cts.	3.40	9.60
Electricity for agitation, 60 kilowatt hours, at 4 cts.	2.40	7.20
Electricity for lime vat, 16 kilowatt hours, at 4 cts.	64	1.28
Sludge pressing and removal (based on experience at Providence, R. I.)	5.11	15.33
Labor supervision—		
Superintendent	\$150	\$150
Junior chemist	75	75
Laborers, at \$75	150	225
	\$375	\$450
Maintenance and supplies	1.00	3.00
	\$30.19	\$366.83
		\$22.28

\*This could be eliminated by having vat set at a sufficient height to feed by gravity. With this item and the sludge pressing out and current at 2 cents, the cost for one million gallons would be \$21.54.

#### SUMMARY OF TESTS.

"A sewage treatment process that can produce, at not too great a cost, an effluent which is not offensive to the senses and that will stand the commonly accepted tests as to non-putrescibility, supplies all that can be expected of it from the effluent point of view. To this must be added consideration of the question of "sludge disposal," always a vexing and expensive one.

"To the question, does the sewage treatment plant at Elmhurst provide an effluent of the character above stated, the answer must be that it does, and this decision can be verified by a simple inspection of the liquid as it passes over the out-fall weir. In appearance it is practically like water and it is without smell; its chemical composition is greatly different from that of the raw sewage; its bacteriological condition is greatly improved and it is non-putrescent. It is, however, the average drop in "color" from 47 to 19 parts per million and the change in "turbidity" from 41 to 7, together with its general good physical appearance, that appeals to the ordinary layman, and he is a competent judge in such matters. The average man may need the laboratory to assist him towards believing that a filthy-looking liquid is really harmless, but he will himself pass judgment upon one that is nearly "water-white." It is true that a fatal error might be com-

mitted by judging of a drinking water after such a manner, but we are here speaking of what is actually known to be a sewage effluent.

"The effluent obtained by the use of the Elmhurst plant is commonly of superior appearance, very markedly in contrast with those to be seen at Jamaica, South Brooklyn, Providence, R. I., and Worcester, Mass. (where lime precipitation is used), at which places the effluents resemble untreated sewage.

"Where bathing is common in a stream into which raw sewage is regularly admitted, there is no question but that a change resulting in the substitution of an effluent such as that commonly furnished by the Elmhurst plant would result in a very material improvement; and, if the stream were a large one, danger to the bathers would be removed. The question is largely one of aesthetics. An undiluted sewage effluent, no matter how pure, it not to be lightly recommended for bathing purposes, although in at least one instance such a liquid is locally used for drinking. What has been said about bathing would apply as well to the action on fish life with the addition that the excess of lime present in the effluent at times would probably be an overdose for some kinds of fish. The dilution by the water of the stream would, however, be probably sufficient to remove all danger.

"It is pertinent to inquire: are the good results observed at Elmhurst due to a dilute sewage? The sewage flowing there is not so strong as at Worcester, Mass., and at sundry other places using lime process plants, yet that it is a true sewage may be seen both from its general appearance and from the following analysis. (Results in parts per million):

	Worcester, Mass.	Average for 7 Mass. Cities.	Elmhurst.
Total solids	873.5	506.5	664
Free ammonia	17.1	26	26.3
Albuminoid ammonia	7.3	5.6	4.8
Oxygen consumed	120.7	66.6	44.2
Chlorine	114	60.3	70
Total organic nitrogen			15.4

"Can the results obtained at Elmhurst be secured by employing lime alone without the use of the electrolyzation process? During the tests at Elmhurst the effect of lime alone on the physical appearance of the effluent was tried out with the following results: Upon two occasions when using the same flow from the lime tank during each test, but cutting out the electric current, a flocculated sewage was obtained which precipitated its solids as well and as quickly as did the corresponding samples obtained at the same point when the plant was running under "normal" conditions, i. e., with electric current and lime both in use. This was graphically shown by photographing the two kinds of samples side by side. No difference in appearance between them could be detected. At other times, however, practically no flocculation was produced when the usual dose of lime was employed without the aid of electrolyzation. In one particular series of experiments this poor result following the use of lime alone was especially well set forth. Tests made in the chemical laboratory using lime both with and without electrolyzation showed that in order to obtain flocculation and precipitation of the solids of the sewage a much larger dosage of lime and more time was generally required when lime only was used than when both lime and electricity were used.

"Lime alone will give a water-like effluent if enough of it be used, as was shown by heavily dosing the Worcester sewage. About 200 grains of lime per gallon added to Worcester sewage produced a water-like effluent after standing half an hour; but when only 30 grains per gallon were employed, the sedimentation period had to be extended to from 4 to 8 hours. At Elmhurst the amount of lime used was only 7½ and 9½ grains per gallon.

"It would appear, therefore, that so far as sedimentation and physical appearance of the effluent are concerned, when electrolytic action is employed less lime is required and precipitation is more rapid.

"There is also a difference between the bacteriological results obtained in the two cases. The destruction of bacterial life by the direct action of the electric current probably does not occur, nor is it necessary to assume such action in order to account for the small number of bacteria found in the final electrolyzed effluent for the reason that simple sedimentation of the heavy flocks of suspended matter that deposit subsequently in the settling basins is quite sufficient to carry down in great numbers all forms of bacterial life.

"There is, however, as already shown, marked difference in the chemical composition of the effluent produced by lime alone as compared with that produced by lime and electrolyzation, as the latter contains less organic matter. The chemical analysis shows that some oxidation of organic matter has taken place. Can any work of this kind be credited to the action of the electric current?

"It is common, when discussing electrolytic processes for sewage treatment, to speak of the liberation of chlorine, or the formation of a hypochlorite by the action of the electric current upon the common salt present in the sewage, and then to credit such substances with much of the beneficial action claimed for the process. Careful chemical examinations, made on sundry occasions, of the effluent from the electrolytic machine at Elmhurst failed to give any reaction whatever for free chlorine or for hypochlorites; and we feel warranted in the conclusion that neither of these substances is present in the electrolyzed sewage at Elmhurst. These examinations indicate that the effluent of the electrolytic process, as carried on at Elmhurst, is different in character from that produced by the addition of lime and a hypochlorite, as for instance, bleaching powder, to the same sewage. We incline to the theory that during the electrolyzation of the sewage in the machine at Elmhurst, nascent oxygen is produced and that neither chlorine nor a hypochlorite is involved in the reaction. It is not claimed that in other plants, using electric means for sewage treatment and operating under different conditions, hypochlorites or chlorine are not produced; all that we state here is that those substances were carefully tested for in the liquid flowing from the Elmhurst electrolytic machine and were not found.

"There is enough electric current passed through the sewage to produce oxygen to the extent of about two cubic centimeters per liter. This volume is not large, but it must be remembered that it is produced in the nascent or atonic state and is therefore at its maximum of oxidizing power. As to the partial aeration of the sewage shown by the increase in dissolved oxygen, the possibility of crediting that to the moving paddles must be borne in mind, but also it must be noted that the paddles are moving in a vessel under pressure which is full of liquid with small chance of securing outside air.

"After comparative operations while the plant was running first with and again without electric current, but maintaining a uniform dose of lime in each case, the change in the appearance of the effluent under these two different modes of treatment suggests the theory that another function of the current is to cause an agglutination of colloidal particles. Furthermore it would seem that such agglutination takes place better in the absence of lime than in its presence. This view would seem to be warranted by the observed fact that better flocculation was secured when the lime was added at the far or exit end of the machine.

"The mode of action of the machine would therefore appear to be, in addition to oxidation, to cause an agglutination of colloidal particles to large size by the electric current and subsequently a coagulation of all suspended

matter by the lime. If measured by weight of matter alone, the former part of this action, viz., that on the colloids, would appear to be less important; yet should it be omitted, clearness of the effluent would not with certainty be secured.

"It is well to note that the qualities of the two effluents (viz., that produced while running with the current on, upon the one hand, and with it off, upon the other, but maintaining the dose of lime constant in each) differ materially when measured by their ability to sustain bacterial life. Thus it will be seen from the data that the low counts of bacteria in the effluent obtained by the use of both current and lime tended to fall still lower when the liquid was set aside for observation, whereas the counts in the effluent obtained when running on lime alone started high and increased to still higher figures upon storage. This difference can probably be accounted for on the assumption that the unstable organic material present in the sewage has been in part removed by the process under consideration.

"As to the sludge produced by the process, its volume is large as compared with that derived from plain sedimentation, being practically the same in amount as that formed by the process using lime alone. This was to have been expected. When these two kinds of sludges were shake up with water and then examined by the usual methylene blue test for putrescibility, we found the sludge produced by the use of lime alone to lose the blue color (i. e., indicate putrescibility) in about two days, thus having a relative stability rating of 50 per cent according to the "Standard Methods" of the American Public Health Association. The sludge from the electrolytic process similarly treated retained the blue color for four days or more, thus possessing a relative stability rating of 95 per cent or more according to the above standard method of rating. With both current and lime employed, the sludge press cake will dry to a stable and odorless brown mass.

In order to ascertain if odor or nuisance would result if the sludge were disposed of by dumping on vacant land, observations were made by two of us of the method of disposal of the lime sludge at Worcester, Mass. The Worcester sludge we found dumped in piles whence the farmers drew it away during the winter months. The odor from these piles was much less than would arise from similar heaps of stable manure. There were houses within one hundred yards of the dumps. Inasmuch as we find the electrolytic sludge to have much greater stability than that produced by the use of lime alone, we believe that if it were to be placed in piles, there would be produced still less odor than the small amount we noted from the dump at Worcester.

"The Elmhurst plant, as we have seen it during the past two months, has been operating upon a daily flow of about three-quarters of a million gallons of sewage. During that time we observed no unpleasant odor in the buildings occupied by the plant, and we noted that the sedimentation tanks had a clean appearance, the liquid in them being more like turbid river water than like the ill-appearing liquids commonly seen in tanks filled with sedimenting sewage effluents.

"By comparison of this installation at Elmhurst with other methods, particularly those involving sedimentation, aeration and filtration through broken stone, sand or other material, the electrolytic process requires comparatively small space, the plant is clean and odorless, the cost of installation is small and is less restricted as to location. In view of the comparative excellence in qualities of effluent and sludge produced and the good character of the general results secured, together with the absence of all local nuisance, we are of the opinion that the use of the process at Elmhurst is justified and is warranted at other places, even at a higher operating cost."



## The WEEK'S NEWS

State Highways in Illinois, Ohio and California—Interstate Mosquito War—Infantile Paralysis and Typhoid Fever—New York's Water Supply—New Street Lighting in Phoenix and Harrison—Milwaukee's Lighting—Fire and Police Officials in Difficulties—New Auto Apparatus—Terre Haute, Wilmington, and Nashville—Massachusetts Railways Fare Increase.

### ROADS AND PAVEMENTS

#### To Use Oil on Illinois Roads.

Springfield, Ill.—The state highway commission will use oil on state aid roads when requested to do so by county boards. This important decision was reached following the receipt of hundreds of queries at the office here as to whether or not the revised Tice road law permitted the use of state funds for oil roads. The commission states that in view of the fact that the application of a properly prepared oil is an improvement to an earth road, they will use oil in the construction of state aid earth roads, when requested by the county boards, but will require thereafter that the county shall pay for reoiling from year to year, or oftener if required, as a part of the maintenance of the roads. An earth road is defined to be a road properly graded and drained; that is, the hills out, the hollows filled, necessary ditches, bridges and culverts built and the whole surface brought to such condition that if it has been properly maintained a durable wearing surface may be laid thereon without repeating any of the work already done.

#### Convict Road Labor in Ohio.

Columbus, O.—Ohio's new law providing for the working of state and county prisoners upon the public roads is now in effect. The law was drafted after conference in New York between representatives of the national committee on prisons and prison labor and the commission to revise the road laws of Ohio. Provision is made for the prison authorities to retain control over the discipline of the prisoners and the regulation of the road camps. The highway authorities have full control over the road work and pay the prison authorities a sum sufficient to cover the cost of transportation, maintenance and discipline of the prisoners, which may include an equitable portion of the overhead charges of the institution in which the prisoners are confined. The highway authorities also pay the amount credited to the prisoners for their work upon the roads. The guards, if there are any, are chosen by the prison authorities, but must as far as possible be competent to supervise the construction work. The same provisions are to be observed when county commissioners work county prisoners upon the roads, while prisoners unable to furnish bond may, upon request, labor upon the roads. The highway authorities are to present to the prison authorities before September 1 each year an estimate of the amount and

kind of material and supplies that can be used in connection with the construction and repair of the state and county highways during the coming year. The manufacture of road material will afford ample employment during the winter to those prisoners used on the roads during good weather.

Road work for state prisoners is not new in Ohio, an average of approximately 300 state prisoners having been worked on the roads during the last few years. These men have worked under the honor system, and Warden Thomas reports that in one camp of from seventeen to twenty men twelve were life-termers, yet there was no attempt at escape. The new co-ordination between the highway and prison departments will make possible a much wider development of the work and place it on a basis fair to all parties interested. Ohio has centralized the control of its state institutions under the state board of administration, which board is successfully organizing the prison industries along state use lines. The national committee on prisons and prison labor hopes to see the county work-houses and jails drawn under this board within the next few years. When this complete centralization is effected the manufacture of supplies for state and county institutions and the road work will furnish ample industrial opportunity for every Ohio convict.

#### City Loses Paving Fight.

Pottsville, Pa.—After a week's trial before Judge Brumm the jury returned a verdict against the city of Pottsville in the case of the City vs. Howard Jones, which had aroused state-wide interest. The city last year paved Market street for a distance of 12 squares with wood block and charged the cost against the property owners. Eighty of them refused to pay and the city brought suit. The defendant property owner alleged that instead of being assessed as a beneficiary of the paving put in, he is really entitled to damages done to his property. He stated that the curbing of dressed stone was removed and the approaches to his house altered without his permission, inflicting damages on the property. In addition to this he claimed that the paving was not an original one under the law but that the street had been paved or improved with macadam three times previous to the laying of the wood block.

#### California Highway Work.

Sacramento, Cal.—Just outside the city limits of Sacramento a great deal of construction work has recently been in progress. The California Highway Commission is paving the Auburn boulevard, north of the city. This work will cost \$50,000. Steam rollers with ploughs and grading teams are at work there. The state department has also begun the Upper Stockton road. The illustration shows the roller and grader at work.

#### Hawaii Motor Road Completed.

Honolulu, Hawaii.—The expenditure of \$55,000 upon the Keaumuku road, at the north end of the island of Hawaii, completes the magnificent scenic auto road clear around the entire island, providing a run of 240 miles of perfect surface. This circular trip is becoming increasingly popular with tourists, the beautiful tropical scenery and the glimpses of the fast-vanishing primitive native life combining with the excellent hotel accommodation to insure an ideal tour. The round journey can be made in two days if desired. Within this circle are four volcanoes, two extinct, one extremely active, and one intermittent crater.



Courtesy Sacramento (Cal.) Bee.  
WORKING CALIFORNIA STATE HIGHWAY

## SEWERAGE AND SANITATION

## Plan Interstate War on Mosquito.

New York, N. Y.—An interstate commission is to be formed to fight the mosquito, according to Health Commissioner Goldwater. He said that this city would aid in the campaign, and that he expected to interest town, county and state officials of New Jersey, Connecticut and New York in the project. Dr. Rupert Blue, Chief of the United States Public Health Service, has offered to aid the commission by placing at its command data bearing upon the extermination of the mosquito. The Mosquito Extermination Commission of New Jersey has also offered its co-operation, and encouragement has been received from the New York State Department of Health. An appropriation has been asked from the Board of Estimate to drain swamps and ponds in the Bronx. Borough President Marcus M. Marks, of Manhattan, has promised his aid also.

## Medical Inspection in Pittsburgh Schools.

Pittsburgh, Pa.—Every child attending the Pittsburgh public schools will be weighed each month and at the expiration of the third month its height will be made a matter of record. Dr. H. J. Benz, superintendent of the Bureau of Child Welfare, has announced that scales will be placed in each school. Of the physical defects found last year, Superintendent Benz states that 56 per cent resulted from bad teeth. He says the work of his bureau demands more help and he will ask council to furnish two additional doctors and four nurses.

## Two Infantile Paralysis Outbreaks.

Providence, R. I.—Fourteen cases of infantile paralysis in the Pawtucket Valley have been reported to the State Board of Health, causing some fear that the disease may spread. The recent cases in this state have not been fatal, with the exception of one death at Pawtucket. The present victims are widely scattered in the vicinity of Riverpoint, making it evident that it has not spread from house to house. The officials as yet have been completely baffled in their attempts to trace the origin. The state board has announced that it wants physicians or others to report all cases of paralysis at once to the board and the health officers, as is specified by law. It is desirous that this be done as speedily as possible in order that no time may be lost in investigating the cases.

Erie, Pa.—Fifty-eight cases of infantile paralysis in the city and fifteen in the county are recorded in the health office. Of this number, less than half are of recent origin. Dr. Herbert Fox, state expert in charge of the situation here, has given out a statement that the outbreak is declining. He presented figures showing this to be undeniable. Between August 28 and September 5, there were fifteen onsets; between September 5 and 11, none, and from the eleventh to the fifteenth, four. He said there was no danger of a further spread.

## Typhoid Cases Increase in Danville.

Danville, Pa.—Nine new cases of typhoid fever, reported in two days, brought the total number of cases during the epidemic here up to ninety-two. There have been no deaths in Danville within the past few days, but two deaths at the State Hospital for Insane in one day make the number of fatalities, that have resulted there from the fever, twenty, including one physician and three nurses.

## Typhoid Spreads Through County.

Springfield, Ill.—An outbreak of typhoid fever, which Menard county authorities and city officials of Petersburg, the county seat, have been unable to check, has caused a call for assistance to be sent to the state board of health. There are eighty cases of typhoid in and near Petersburg, sixteen in and near Athens, nine at Greenview and scattering cases in other parts of the county. Some deaths have occurred. There are several cases in adjoining counties also, it is reported, and the cause of infection is believed to be the same as in Menard county. Dr. E. F. Baker, of Jacksonville, medical inspector of the State Board of Health, has taken charge of the situation.

## WATER SUPPLY

## Birmingham Cannot Buy Waterworks.

Birmingham, Ala.—The House of Representatives at Montgomery, by a vote of 44 to 31, has laid the waterworks condemnation bill on the table. The bill would have given Birmingham the right after 1921 to condemn for purchase the property of the Birmingham Waterworks company. It is the general understanding that the fight for and against the bill was bitter on account of the fact that the right of condemnation would have materially affected the price of the property in the present negotiations between representatives of the company and city for the acquisition of the property of the latter. It is said that the passage of the bill would have affected the value of the waterworks to the extent of practically \$1,000,000.

## Salt Lake's Water Decreasing.

Salt Lake City, Utah.—Salt Lake's water supply situation is reported serious. The supply from canyon streams dropped to 19,000,000 gallons, some 10,000,000 to 12,000,000 gallons less than needed by the city to take care of sprinkling and domestic consumption. The supply has been gradually growing less since early September storms relieved conditions, and water department officials say that unless there is another storm soon the situation is apt to become quite serious. The low condition of the reservoirs is attributed by the water department officials to violation of sprinkling regulations. Superintendent Barrett says people all over the city are sprinkling without regard to sprinkling hours and even without regard to the days set apart for sprinkling, with the result that there is a constant draft on the city supply and the department is unable to get water in the reservoirs at night to meet demands. This season is one of low water and the streams will continue to decrease, the officials say, possibly until the middle of this month. Hence, it is said, the only relief the city can expect is from economy.

At a conference between officials of the city water department and officials of the United States forestry office an agreement was reached whereby the forest rangers will prevent camping along the canyon streams on government property and will also prevent grazing of cattle on the forest reserve along streams from which the city and county secure their water supply. At a previous conference between the forestry officials and Dr. C. C. Snyder, of the county health department, a similar agreement was reached guarding against pollution from various sources even outside of the federal jurisdiction. Under the new arrangement, therefore, federal, county and city authorities will co-operate to prevent pollution of water.

## New York Supplies 508 Million Gallons Daily.

New York, N. Y.—Some idea of the immensity of the work which is being done by the Department of Water Supply, Gas and Electricity, and the economies which the present administration has brought about, is given in the annual report of Commissioner William Williams. His department in 1914 expended \$11,600,000. In return it managed property worth \$226,315,900, supplied the inhabitants of the city with 508,000,000 gallons of water each day, lighted the parks, streets, bridges, and public buildings, and collected \$12,909,042 in water rents. Of the quality of the water the Commissioner said: "New York had last year a typhoid death rate of only 5.9 per 100,000 inhabitants, which is the lowest for the ten largest American cities, and even this low rate is steadily decreasing. The water supplied by the city is shown by analysis to be better now than it has for many years, and it is safer to drink than most bottled waters." The report states that there are 2,845 miles of city-owned water mains, controlled by some 60,000 gates. There are more than 43,000 fire hydrants. Last year the department laid seventy-five miles of new mains. The value of the real estate owned by the city and controlled by the department is put at \$86,000,000, exclusive of structures which, including dams, are worth another \$82,000,000. The total area of city-owned property under the department's control is 25,000 acres, of which 23,763 acres, or more than one and one-half times the area of Manhattan Island, are



outside the city limits. Of this territory, the report says, one-half consists of reservoirs, lakes and ponds. Reference is made to the new Catskill supply, which will be available late in 1916 and provide 250,000,000 gallons of water daily. At the close of 1914 there were 345,275 consumers' accounts on the Water Register's books, an increase of 3,314 over the previous year. Of these 246,407 were frontage accounts and 98,868 meter accounts. There were 2,800 employes of the department in 1914, getting \$3,570,000. The payroll of the Bureau of Water Supply was reduced by more than \$200,000.

## STREET LIGHTING AND POWER

### New Street Lighting for Phoenix.

Phoenix, Ariz.—Phoenix is having its lighting system improved in a number of streets. At least 72 new lights are in the process of being installed by the Pacific Gas & Electric Company at locations selected several months ago by the city commission. In addition, there are to be new ornamental lighting standards installed along Central avenue, practically to the city limits, and along West Washington street from Seventh avenue to the capitol. A new ornamental standard has been designed for the Central avenue and Washington street installations. It is a single Doric column, of cast iron, 12 feet 2 inches from the base to the top of the 12-inch frosted globe, carrying a 200-watt nitrogen lamp. Present plans call for the putting into service of 294 of these new ornamental standards. The 200-watt nitrogen lamp has already been in use in several sections of the city and it has been demonstrated that the single lamp gives more and better illumination than the five lights.

### No Contract—Lights Out.

Crestline, O.—The streets of the village of Crestline are to remain in darkness until the Southwestern Company, which has been given a franchise to furnish street lights, is able to make the proper connections and install the cluster system, according to the contract signed Aug. 26. The action of the Crestline council, in asking the company, which had the lighting franchise, to discontinue the service, is the outgrowth of a long and bitter fight between the city and company. The light company's contract with the city expired the first of last April and had never been renewed. New rates were submitted to council for commercial use and city use, but council maintained that they were exorbitant and refused to give the company a new franchise. Council also claimed that the service, as far as the street lighting is concerned, was far from satisfactory and that half the time the lights were not burning. Deductions had always been made for the time any of the lamps were not burning, and, according to statement of councilmen, these cases were so frequent that the night police were unable to keep tab on the time the lights were out. Besides being given a franchise to furnish current for street lighting purposes, the Southwestern was also given a franchise to furnish current and power for commercial uses. This means that the Crawford County Gas & Electric Company will have a competitor.

### Milwaukee's Street Lighting Deficient.

Milwaukee, Wis.—A preliminary statement on the street lighting situation in Milwaukee has been issued by the City Club, with the announcement that its committee on street lighting will issue a report on the findings of the survey made for the city by the firm of Vaughn, Meyer & Sweet. The club's introductory public statement says: "It is generally conceded that Milwaukee is a poorly lighted city. The number of lights used (2,300 arc lamps and 3,400 gas and gasoline lamps) is wholly inadequate to light the streets, even if the lamps were of an efficient, modern type. Large areas in the city have for some time been without any lamps whatever, while other areas have been dimly lighted by an insufficient number of lamps. As a result of this inadequate lighting, a number of criminal assaults have occurred in the city, the majority of which have never been brought to the attention of the public. The inadequacy of our lighting system has been made still

worse by the fact that the lamps now in use are obsolete and extravagant. Milwaukee's per capita expenditure for street lighting is lower than that of any other city of approximately the same size. The comparison is as follows:

City.	Per Capita Expenditure.
Washington .....	\$1.45
Cincinnati .....	1.06
Minneapolis .....	1.03
Pittsburgh .....	.96
Buffalo .....	.91
San Francisco .....	.83
Los Angeles .....	.80
New Orleans .....	.79
Newark .....	.77
Baltimore .....	.69
Detroit .....	.69
Jersey City .....	.63
Milwaukee .....	.59

Average for above (excluding Washington) ..... \$0.81

"The contract, which the city has with the electric company to light the streets, expired in 1910 and has not been renewed. In the absence of a contract, the electric company has been unwilling to extend the service or introduce improvements because of uncertainty as to whether the city would continue to use the new lamps for a long enough period to insure a reasonable return to the company on the investment. Thus, while the city has been growing rapidly, the lighting system has stood still."

### Harrison Celebrates Its New White Way.

Harrison, N. J.—Harrison has with great ceremony celebrated the inauguration of the fine, new street lighting on Harrison avenue, the main street. Processions, bunting, parades and dancing on the street marked the festivities. Neighboring towns in West Hudson, including East Newark, Kearney, Arlington and North Arlington joined in the occasion and sent firemen to march in the parade. The white way consists of forty-three new lamps.

## FIRE AND POLICE

### San Francisco's Central Fire Alarm Station Opened.

San Francisco, Cal.—The formal opening of the new central fire alarm station in Jefferson square took place before several hundred citizens, who listened to brief addresses by Mayor Rolph, the fire commissioners, Fire Chief Murphy and Chief Barry, of the Department of Electricity. The speakers claimed that this was the best designed and equipped central alarm station in the country. It was said neither quake nor conflagration would impair the station, on account of its isolation and strong construction. Chief Barry, of the department of electricity, who has charge of the station, said the equipment more than met the requirements of the board of fire underwriters. The building cost \$38,000 and the equipment \$42,000. A demonstration of how the apparatus operates was given, alarms being sent in at preconcerted signals by the battalion chiefs from various points in the city.

### Tired of Waiting, Department Sets Fires.

Hartsdale, N. Y.—Eleven members of the Hartsdale volunteer fire department are in the county jail at White Plains on charges of arson as result of an investigation made by Sheriff Wiesendanger and Deputy Sheriff John Moore of a number of mysterious fires in the village. The first four arrested are said to have confessed to the sheriff that the young men in the Hartsdale fire department set a number of fires just for the excitement they got out of fighting the flames. They determined who should set the fires by drawing cards. The man who drew the first ace went out and started the fire and the others responded to the alarm. One of them, who is a mounted policeman, was tipped off and discovered the blaze. Hartsdale fire company, No. 1, was organized in 1906 by well-to-do New York business men, commuters and residents in the town, but petty local politics stirred up a fuss in the company and about a year ago a number of the original members

got out, and a large number of the town's young men took their places. The company numbers about fifty-five members now. The property owners and commuters who organized it raised about \$3,000 to buy apparatus. The desire to use the machine was one of the causes given as leading to the incendiary ambitions of the men.

#### Chiefs Reduced.

Elkhart, Ind.—The board of police commissioners have reduced William H. Roth, chief of police, to patrolman. The board is endeavoring to find a suitable man outside the police department to be chief. Experience, the members claim, has taught that a man promoted to chief from the department fails to enforce necessary discipline.

Butte, Mont.—By a vote of 12 to 3 the city council has found Morgan Griffiths, chief of the fire department, guilty of charges of usurping his office and incompetency filed by Thomas Fox, a clerk in the engineer's office. He was discharged from the department, and president of the council, M. D. O'Connell, immediately appointed him as a fireman, and the council approved the appointment. Thus the judgment of the majority of the council was in effect a reduction to the ranks for Griffiths. State law makes no provision for such judgment by direct method, so the round-about way was necessary. The chief was charged with favoritism, causing dissension in the department and being a member of a firemen's mutual benefit association.

#### Fire Sweeps Summer Resort.

Hampton Beach, N. H.—A blaze, starting in a box of rubbish, swept quickly through the most thickly settled part of this summer resort and destroyed more than 50 buildings before it was checked by dynamite. The loss is estimated at about \$200,000. Five hotels, 10 stores, the Episcopal chapel and dozens of cottages were leveled by the wind-driven flames in the heart of the business section. The water supply held out for only an hour. As the regular season at the beach had closed there were only a few cottagers to join in the volunteer fire department and help was called from Portsmouth, Exeter, Hampton, Amesbury, Mass., and Salisbury. In less than half an hour the flames were beyond control of the few fire-fighters available. Showers of sparks started scores of roof fires far ahead of the main conflagration and it was not until help from surrounding places arrived with dynamite that any impression was made on the wall of fire. Chief Ring expressed the belief that boys playing with matches in a dry goods box filled with kindling wood and excelsior started the fire.

#### Lightning Sets Power Plant On Fire.

Evansville, Ind.—Lightning struck the power plant of the Evansville Public Service Company, setting it on fire, but the fire department saved it from destruction. The loss is about \$50,000. The plant provides power for the electric lights, the city street car lines and the Evansville & Princeton traction line. The city was without electric lights for the night and the cars were tied up. Main street was in darkness and was thronged with people, several special policemen being required to handle the crowds.

#### New Central Station in Service.

Stamford, Conn.—The new Central Fire Station of the city is now in service, having been recently opened with appropriate ceremonies. Mayor Brown, Chief Harry W. Parker and three ex-mayors delivered addresses. The new building is a fine modern structure with many provisions for the comfort of the men.

## MOTOR VEHICLES

#### New Engine Makes Good Showing.

Bethlehem, Pa.—The official test of the new motor fire engine recently delivered to the borough by the American LaFrance Fire Engine Company of Elmira, N. Y., was made for a period of one and one-half hours, and proved very satisfactory to Chairman H. A. Becker, of the fire committee, and Fire Chief C. E. Bender, who witnessed the demonstration at the Monocacy Creek. The motor engine is a type No. 10, and the contract requires a discharge of 500 gallons per minute at a 120-pound pump pressure from draught. The capacity was exceeded by nearly 100 gallons in the test. The first test with a 50-foot hose line, 1½-inch nozzle, 78 pounds nozzle pressure, and 122-pound pump pressure showed a discharge of 589 gallons per minute during the 130-minute period of the test. In the second test, a 150-foot line of hose was used with a ¾-inch nozzle, 180-pound nozzle pressure and 230-pound pump pressure. The discharge per minute amounted to 275 gallons for a 15-minute test. In the third test two lines of 150 feet of hose, one siamesed into 250 feet of line, were used with three ¾-inch nozzles, a pump pressure of 110 pounds and nozzle pressures of 80, 50 and 50 pounds. The total discharge was 520 gallons during the 15-minute pumping. In the fourth test, 150 feet of hose were used with an inch nozzle attached and a nozzle pressure of 130 pounds and a pump pressure of 180 pounds. The discharge of water amounted to 337 gallons per minute. The test lasted 15 minutes. The last test was made from a 60-pound fire hydrant with a line of 150 feet of hose, 1½-inch nozzle, 80-pound nozzle pressure and 130-pound pump pressure. The water discharged amounted to 596 gallons per minute. The test lasted 15 minutes. During the test of the apparatus the engine was shut down for five minutes in order to change a broken spark plug. In a speed test between Bethlehem and Allentown the engine developed a speed of 55 miles per hour.

#### Triple Combination Exceeds Requirements.

Charleston, S. C.—The new Seagrave triple combination pumping engine and fire wagon of the city fire department met and exceeded every requirement at its official test. Five different tests were given the big apparatus, and the results were entirely satisfactory, according to Chief Louis Behrens. After the end of the test he announced that the engine delivered 116 gallons a minute more than the specified 1,000 gallons. Among those from other cities who witnessed the tests of the engine were Mayor Cox, Alderman DePass and Fire Chief Trnett of Darlington; Chief W. L. Jackson of Anderson; Capt. Finn, of Sumter; Chief Beaudrot and Mr.



Courtesy, Stamford (Conn.) Daily Advocate.

STAMFORD'S NEW CENTRAL FIRE STATION.



# Multnomah County, Oregon



## AWARDS

### Big Road Contract For Warrenite

After ten years' practical use of Bitulithic in the City of Portland, Oregon, and three years' practical test in the use of **Warrenite** surface, Multnomah County (which county includes and surrounds Portland, Oregon) in June, 1915, after a most thorough investigation of all substantial types of road construction, awards contracts for surfacing of 631,076 square yards of **Warrenite** surface, this being, it is said, the largest country road contract ever let in America.

The following is a list of roads, yardage of each, and contractor, to whom the Multnomah County work was awarded:

Sandy Road, Sec. A & B, 136,000 sq. yds.; Warren Const. Co.

Columbia River Highway, Secs. A, B and C, 179,820 sq. yds.; Warren Const. Co.

Columbia River Highway, Sec. D, 97,244 sq. yds.; Pacific Bridge Co.

Canyon Road, Sec. A, 8,620 sq. yds.; Warren Const. Co.

Base Line Road, Sec. A & B, 93,222 sq. yds.; Clark & Hencry Const. Co.

Powell Valley Road, 81,640 sq. yds.; Oskar Huber.

St. Helens Road, 4 sections, 34,530 sq. yds.; Oskar Huber.

Total, 631,076 sq. yds.

#### EX-PRESIDENT W. H. TAFT AND ESCORTS ON COLUMBIA RIVER WARRENITE HIGHWAY

Members of Party on Bridge: Left to Right—Edgar B. Piper, Managing Editor of The Oregonian; Judge C. H. Carey, of Portland; Ex-President Taft; S. Benson, "Oregon's First Citizen"; John B. Yeon, Multnomah County Roadmaster who directed Construction of the Highway; Amos Benson, Prominent Good Roads Worker to Whom Much is Due for Success of Project. Multnomah Falls and Benson Bridge is in the Background. Insert—Members of Party on Bridge at Shepperd's Dell.

(Photograph reproduced by courtesy of Motoroad, Published at Portland, Oregon.)

This work is now under construction, an average of a mile per day being completed. It is an example for other counties to follow.

A report of the Portland Chamber of Commerce special paving committee, dated June 12, concludes:

"We are certain that everybody concerned in this paving problem who is entirely disinterested, has been, and is now, seeking to get the very best available pavement for the county, because it is realized that, in so doing, the county will be furnishing an object lesson which will be an incentive to depart from the unwise policy of the past, which has resulted in throwing money away for useless macadam roads."

Do not hesitate—investigate for yourself or let us show you the value of surfacing your roads with **Warrenite**.

Write to-day for illustrated booklets and learn more about this modern ideal country road surface.

**Warrenite** specifications and form of mixture agreement available to all contractors.

## WARREN BROTHERS COMPANY EXECUTIVE OFFICES: BOSTON, MASS.

### DISTRICT OFFICES:

New York, N. Y.  
59 Church St.

Rochester, N. Y.  
303 Main St., West

Chicago, Ill.  
1850 Otis Bldg.

Los Angeles, Cal.  
926 Calif. Bldg.

Portland, Ore.  
Journal Bldg.

Phoenix, Ariz.  
204 Noll Bldg.

Nashville, Tenn.  
606 Independent Life Bldg.

Richmond, Va.  
Virginia Railway & Power Bldg.

St. Louis, Mo.  
Railway Exchange Bldg.

# BITULITHIC

"THE BEST BY EVERY TEST"  
FOR RESURFACING SOUND MACADAM

The illustration below shows the **Bitulithic** Pavement on Dartmouth Street, Boston, Mass., laid over crushed stone base in 1903. Photograph taken June 15, 1914, after eleven years' use. Marlboro Street, Boston, from Clarendon Street to Charles Gate East, was surfaced over the old macadam with **Bitulithic** in 1914.

Why go to the expense of tearing up your old macadam street and constructing concrete base, when you can save this cost by surfacing your street with

## BITULITHIC

The pavement which is built up to a high standard and not down to a low price?

A **Bitulithic** paved street is a good asset for a city. Nothing adds more

to the appearance of a city than well-paved streets.

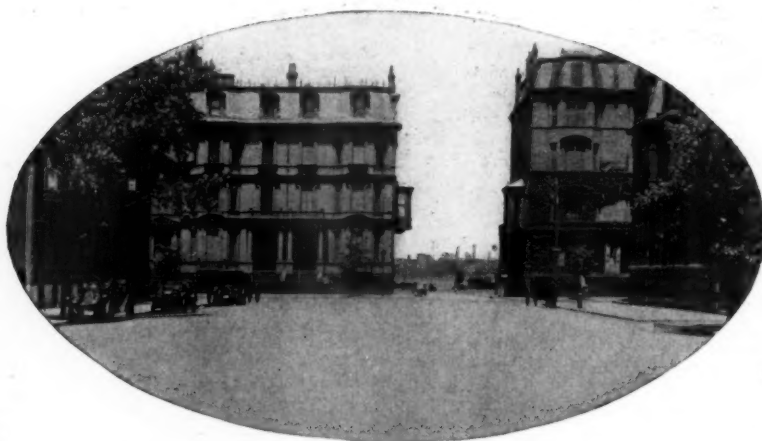
It is cheaper to have the best pavement in the beginning than to contract for a pavement which has to be repaired, if not entirely resurfaced, in two or three years.

**Bitulithic** is a pavement adapted to business streets as well as residential.

The greatest care is used in the mixing and laying of the **Bitulithic** pavement.

**Bitulithic** is constructed for all kinds of traffic. It is composed of varying sizes of the best stone obtainable, combined with bituminous cement and laid under close laboratory supervision.

QUALITY FIRST is the motto of the **Bitulithic** Pavement.



Write today for  
explanatory booklets.

DARTMOUTH STREET,  
Boston, Mass., June 15, 1914,  
from Marlboro street, looking  
toward Beacon street. Bitulithic  
surface, laid on macadam in  
1903.

## Warren Brothers Company

Executive Offices: BOSTON, MASS.

### DISTRICT OFFICES:

New York, N. Y.  
50 Church St.

Chicago, Ill.  
10 S. LaSalle St.

Rochester, N. Y.  
303 Main St., West

Los Angeles, Cal.  
926 Calif. Bldg.

Portland, Oregon  
Journal Bldg.

Phoenix, Arizona  
204 Noll Bldg.

Nashville, Tenn.  
606 Independent Life Bldg.

Richmond, Va.  
Virginia Railway & Power Bldg.

St. Louis, Mo.  
Railway Exchange Bldg.



Baker of Greenwood. The results of the five different tests were:

Test No. 1. Three lines of 2½-inch hose, 200 feet, 1¼-inch smooth nozzle; nozzle pressure, 65 pounds; pump pressure, 120 pounds; gallons delivered, 1,116; remarks, satisfactory.

Test No. 2. Three lines of 2½-inch hose, 100 feet, Siamese into deluge set, 2 inch smooth nozzle; nozzle pressure, 64 pounds; pump pressure, 130 pounds; gallons delivered, 950; remarks, satisfactory.

Test No. 3. One line 2½-inch hose, 150 feet, 1¼-inch ring nozzle; nozzle pressure, 70 pounds; pump pressure, 200 pounds; gallons delivered, 580; remarks, satisfactory.

Test No. 4. Three lines, 100 feet, 2½-inch hose, Siamese into fifty feet, 3-inch hose, water tower, 2-inch smooth nozzle; nozzle pressure, 60 pounds; pump pressure, 150 pounds; gallons delivered, 920; remarks, satisfactory.

Test No. 5. One thousand feet, 2½-inch hose, 1¼-inch smooth nozzle; nozzle pressure, 80 pounds; pump pressure, 270 pounds; gallons delivered, 415; remarks, satisfactory.

General remarks on entire tests: Excellent.

The pumps on the machine are of the centrifugal type. The hose car has a six-cylinder 109.3-horsepower motor. The machine carries a 40-gallon chemical tank and 300 feet of chemical hose, and has a capacity of 1,200 feet of 2½-inch hose, besides being fully equipped with a 30-foot ladder, 12-foot roof ladder, extinguishers, axes and all other accessories.

#### New Truck Ordered.

Fredonia, N. Y.—Fredonia will have an up-to-date automobile fire truck within the next three months, the trustees having contracted with the American-LaFrance Company for a \$5,500 machine, to be delivered in 90 days. The purchase of the machine is in accordance with the taxpayers' vote last spring when authority was granted for an appropriation of not over \$6,000 for this purpose. Since that time, the trustees and the committee appointed from the fire department have been investigating a large number of makes and inspecting various machines in actual service. At Jamestown they were particularly impressed with the work of the American-LaFrance machines in service there and with the testimonials of the city officials. The truck will be a four-cylinder, 70-horsepower type and will be equipped with all improvements such as electric starter, electric lights, etc., together with 1,200 feet of hose, a 40-gallon chemical tank and hose, ladders, etc.

### GOVERNMENT AND FINANCE

#### All Big New York Bond Issues Sold.

New York, N. Y.—The syndicate headed by Kuhn, Loeb & Co., William A. Read & Co., and Kidder, Peabody & Co., which bought \$45,000,000 4½ per cent city bonds of the total of \$71,000,000 offered last June, have announced that all the bonds have been sold. The syndicate's purchase price was 101.044 for the \$33,734,640 fifty-year bonds and 101.166 for the \$11,353,300 serial bonds, and the offering price of the long-term bonds was 102. In recent weeks the market for municipal bonds has gradually improved, and this syndicate took advantage of the call for sound investments to dispose of their holdings of the most recent city issue at a fair profit. The 4½s sold as high as 102½, while the city 4s displayed firmness. Satisfaction was expressed in Wall street over the distribution of so large a block of bonds in three months. Predictions were made when the syndicate's bid for all or any part of the issue was announced that the state of the bond market under war conditions would drag out the distribution of the securities over a long period. Bond men are unanimous in saying that the market for municipals has taken an encouraging stride forward this month. A factor has been the approach of the personal tax day, October 1, a date when past events have shown that many possessors of large bank accounts prefer to convert cash into a non-taxable bond.

#### Terre Haute's Mayor Impeached.

Terre Haute, Ind.—Thirty-five charges of misuse of city funds and city property, padding the city payroll, appropriating city funds and city property to his own use, extortion of money from city employees for private use, non-payment of debts, excessive use of liquor, using his office for private gain, making false charges against members of the common council, causing liquor to be brought

into the city hall, that he is immoral and corrupt, that he is a drunkard, that he misused city payrolls, that he is a tax dodger, that he bears a bad reputation for truth and veracity, and numerous other minor charges were made against Mayor James M. Gossom, in a unanimous vote for impeachment by the common council. Another charge was made against the mayor by members of the Jitney Drivers' Union, who allege the mayor had been using the police to aid the traction company in its suit in the federal court against the jitney men. Mayor Gossom took office when former Mayor Donn M. Roberts was impeached, following his sentence to the Federal Prison at Leavenworth, Kan., for election frauds. Gossom was appointed city comptroller by Roberts during the election conspiracy trial in order that a man of his own choice would succeed him. Although Gossom was one of Roberts' faithful followers, yet when he took the convicted mayor's place he discharged most of his chief's appointees. He instituted a number of reforms, including an efficient reorganization of the police force, driving the redlight district back from the neighborhood of the state normal school and reorganizing boards of officials. Gossom is fighting vigorously at his trial and charges that his impeachment is due to the combination of the council with the brewery interests who object to his "closed lid" policy.

#### Commission-Manager for Santa Barbara.

Santa Barbara, Cal.—By the vote of 707 to 429, Santa Barbara has adopted the manager-commission form of government. The vote was extremely light, as the total registration is more than 6,000. The charter adopted must be referred to the legislature.

#### Mayor and Council Indicted.

Wilmington, N. C.—Bills of indictment for alleged irregular practices in recent city elections have been returned against Mayor P. Q. Moore, Councilman W. J. Bradshaw, L. M. Bunting and W. F. Jones, Former Councilman D. N. Chadwick in two cases, and Mr. John J. Furlong, superintendent of streets for the city of Wilmington, by the grand jury. These indictments are supposed to have been made on presentments from the last grand jury. The cases will probably come up for trial at the next term of superior court. Those directly interested in the indictments have denied that they have at any time been guilty of intentional violation of any statutes.

#### Anti-Administration Candidates Win in Nashville.

Nashville, Tenn.—The municipal election, held for the selection of two city commissioners, resulted in the election of Paul W. Treanor, for finance commissioner, and George J. Tompkins, for fire commissioner. Treanor received 4,184, and his opponent, J. B. Armstrong, 4,155. Tompkins received 4,918, and J. J. Killen received 3,458. Little interest was manifested in the race between Tompkins and Killen. Both ran as anti-administration candidates. The principal fight was between Treanor and Armstrong. The latter had the backing of the Howse faction and the firm of Pitts & McConnico, attorneys for the deposed city commissioners. Backing Treanor were Stokes & Cherry, attorneys prosecuting the "ouster" suit against Howse. Mr. Stokes declared that if Armstrong should be elected he would go before the chancellor and withdraw from the lawsuit. An "ouster" bill, seeking to remove Chief of Police Alex Barthell and City Detective Mose Dixon has been presented by Attorney Stokes, chief counsel for the taxpayers in the city hall scandal.

#### Cincinnati Slashes Its Budget.

Cincinnati, O.—The budget commission has made the cuts required in the estimates of Cincinnati schools to bring these budgets down to the limit allowed under the law. A total of \$2,690,617 was deducted from the city estimates and \$438,862 from the estimates of the board of education. In order to bring the estimates of various departments within the 5-mill limitation provided by law, the estimates were reduced by \$2,262,367, divided as follows: General fund, \$41,690.05; health, \$80,449.14; safety, \$928,535.40; service, \$779,396.04; hospital, \$307,018.28; parks, \$125,-

278.09; total, \$2,262,367. To estimate within the 10-mill limitation the further amount of \$856,500 was taken, equally divided between the city and school budgets. The city estimates called for \$6,281,103.17. The budget commission also fixed the tax levy for the county at \$13.56 for every \$1,000 valuation. The levy will be divided as follows: For state, 5 cents; for county, \$2.63; university and observatory, 60 cents; library, 26 cents; schools, \$3.36; city, \$6.10. To this is to be added mandatory levies of 30 cents for roads, 14 cents for county and 2 cents for city. If the people vote extra levies to be asked by schools and city, the rate will be \$15.46 for every \$1,000.

## STREET CLEANING AND REFUSE DISPOSAL

### No Funds—No Street Cleaning.

Syracuse, N. Y.—That the "white wings" will be taken off about November 1 and street repairs except in cases of absolute necessity will be closed for the year on account of the lack of funds are conclusions reached by the department of public works at a conference of Commissioner Thomas H. Mather, Deputy Commissioners W. A. Steckel and Murray C. Street and Chief Clerk David Thomas. The commissioner will have to take care of leaves and extraordinary street cleaning by a special force.

### New Street Car Flusher for Columbus.

Columbus, O.—The new street flusher car purchased by the Columbus Railway, Power and Light Company, to be used by the city in flushing the streets after midnight, has been given its official test under the direction of N. A. McCoy, superintendent of the city street cleaning department. City council has entered into contract with the street railway company to furnish the water and operate the flusher which is the property of the street car company. It will be at the disposal of the city and is expected to save about \$5,000 a year in cost of street flushing. The car has a 4,000-gallon tank mounted upon it and has nozzles at either end and a plow in the middle. It may be used for clearing snow from the tracks during the winter, as well as flushing the streets. Rotary brooms can also be attached to it for sweeping the tracks. It will be operated every night over most of the 25 miles of street car tracks in the city, under the direction of the municipal street cleaning department. The city will pay the car company \$10 a night for use of the car. A similar plan has been in operation in Cleveland for several months.

### Strict Specifications for Garbage Contract.

Atlantic City, N. J.—Bristling with penalties should any provisions be violated, the specifications for the removal and disposal of Atlantic City's garbage for five years beginning September 1, 1916, have been unanimously approved by the city commissioners. These specifications have been the result of several years' work by Director Bacharach and his fellow officials to secure a remedy for the odors which have been caused by the present crematory. For causing offensive odors the penalty will be \$100 for each day of 24 hours during which or any fraction of which odors shall arise except in case of breakdown, written notice of which shall be given to the department of parks and public property within two hours after same occurs, in which case not more than 24 hours shall be allowed for repairs before said penalty shall be incurred. The contractor is to supply each place from which garbage is to be collected with a card or cards specifying the days and hours when collections will be made, and the receptacle in which the householder is to deposit garbage. Fines are provided for as follows: (a) Garbage not collected as agreed, \$5 per house; (b) garbage carts overloaded, leaky or filthy, \$2 per cart; (c) failure to discharge employees after notice, \$2 for each day after said notice until discharge; (d) dead animals not removed as required, \$5 each; (e) not using special wagons, when notified by health department, for collecting from houses where contagious diseases exist, \$10 for each house.

## RAPID TRANSIT

### Street Railway System Wants Fare Raise.

Boston, Mass.—The Bay State Street Railway Company, operating 939 miles of street railway in the state, has asked the public service commission for an increase in fares to 6 cents. The commission is given by law six months in which to decide upon the request. According to statements from President Sullivan of the company, and its attorney, James F. Jackson, the reason given for the demand is that in the progress of its growth and expansion the company has been called upon to absorb a great many small street railways which never produced anything over their operating expenses, and some of which never should have been built. Plans are being made in the 85 cities and towns served by the company to have a powerful opposing case when the question comes up for hearing.

### Jitneys Win Injunction.

Portland, Ore.—Representatives of the jitney drivers' union are circulating a referendum petition against the jitney ordinance. If such a referendum petition is filed, the ordinance will be held in abeyance until the next regular city election in June, 1917. A temporary injunction restraining the city from enforcing the ordinance has been issued by Judge Bagley, of Hillsboro, on the ground that the council had no authority to pass an ordinance with an emergency clause. Judge Bagley held that the commissioners of the city of Portland must give opportunity to the people to vote upon any ordinance passed by them. He declared also that the section of the jitney ordinance requiring an applicant to obtain a certificate from the commissioner of public utilities as a prerequisite to obtaining a license to operate a jitney or for its transfer or change of route is void. The reason is that the ordinance imposes no duty upon the commissioner to issue the certificate and prescribes no terms upon which it shall be issued. In addition, the ordinance makes no provision to control the commissioner in the performance of any duty imposed upon him by the ordinance. The jitney ordinance has 26 provisions. A. W. Lafferty, counsel for the jitney union, said if the council would withdraw four of these provisions the jitney men would not oppose the ordinance further but would consent to its going into effect October 3. The objectionable provisions are these: The requirement that jitneys must stop on the near side of the street. It is the contention of the jitney owners that this is a deliberate effort to force them out of business. They say passengers are accustomed to wait for cars or jitneys on the far side of the street. They demand a decrease in the license rate from \$2 to \$1 a month. They object to the provision limiting the number of passengers in a jitney to its seating capacity. They do not want to install a lighting system in all cars.

### New Jitney Legislation.

Flint, Mich.—After a stormy debate in which Dr. J. H. Beckwith declared that in his opinion the mayor and certain aldermen were in a measure responsible for the death of 5 persons in a grade crossing accident, the amendment to the jitney ordinance requiring liability insurance policies was passed by the common council. The amendment provides for a liability insurance policy to be taken out by each jitney bus operator before a license may be issued, and contains a scale of liabilities for injuries or damages to property according to the carrying capacity of the car, to take effect October 1.

San Diego, Cal.—Unless Mayor E. M. Capps vetoes the amendment, auto busses will be required to operate 18 hours a day and to maintain the same terminals which are now maintained by the street car company. Regulation was demanded by the street car men, who presented a petition which was signed by 3,000 and more voters who favored the amendment. Thirty-six conductors and motor-men and 291 machinists, carpenters, trackmen and linemen had already been laid off on account of the "unfair competition of the autobusses."



## NEWS OF THE SOCIETIES

### Calendar of Meetings.

**Oct. 4-9.—AMERICAN ELECTRIC RAILWAY ASSOCIATION.** Convention, San Francisco. Secretary, E. B. Burritt, 8 West 40th St., New York City.

**Oct. 5-8.—PENNSYLVANIA STATE FIREMEN'S ASSOCIATION.**—Annual Convention, Philadelphia. President, Miles S. Humphreys, Pittsburgh, Pa.

**Oct. 6-8.—NATIONAL HOUSING ASSOCIATION.**—Minneapolis, Minn., Secretary, Lawrence Veiller, 105 East 22d St., New York City.

**Oct. 11-12.—VERMONT SOCIETY OF ENGINEERS.**—Annual convention, Springfield, Vt. Secretary, Geo. A. Reed.

**Oct. 11-15.—NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION.**—Annual convention, Dayton, O. Secretary, Will P. Blair, B. of L. E. Bldg., Cleveland, O.

**Oct. 12-15.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.**—Annual convention, Dayton, O. Secretary, Charles Carroll Brown, 702 Wulsin Bldg., Indianapolis, Ind.

**Oct. 13-15.—LEAGUE OF KANSAS MUNICIPALITIES.**—Seventh annual convention, Convention Hall, Hutchinson. Secretary, C. H. Talbot, University of Kansas, Lawrence.

**Oct. 18, 19.—ELECTRIC VEHICLE ASSOCIATION OF AMERICA.** Sixth annual convention, Statler Hotel, Cleveland, O. Secretary, 29 West 39th street, New York.

**Oct. 20.—LEAGUE OF MINNESOTA MUNICIPALITIES.**—Third annual convention, Virginia, Minn.

**Nov. 9-12.—ATLANTIC DEEPER WATERWAYS ASSOCIATION.**—Eighth Annual Convention, Savannah, Ga.

**Nov. 10-12.—CONFERENCE ON PRINCIPLES AND METHODS TO BE APPLIED IN VALUING PUBLIC UTILITIES.**—Under auspices of the Utilities Bureau, 1009 Finance Bldg., Philadelphia, Pa.

**Nov. 16-18.—PENNSYLVANIA INDUSTRIAL AND PUBLIC WELFARE AND ENGINEERING CONGRESS.**—Third conference, Harrisburg, Pa.

**Nov. 17-19.—NATIONAL MUNICIPAL LEAGUE.**—Annual Convention, Dayton, O. Secretary, Clinton Rogers Woodruff, 705 North American Bldg., Philadelphia, Pa.

**Dec. 27-Jan. 8, 1916.—SECOND PAN-AMERICAN SCIENTIFIC CONGRESS.**—Washington, D. C., Department of State, Washington.

**Feb. 15-18, 1916.—SECOND NATIONAL CONFERENCE ON CONCRETE ROAD BUILDING.**—Secretary, J. P. Beck, 208 S. LaSalle St., Chicago, Ill.

### American Society of Municipal Improvements.

In addition to the program of the convention of the American Society of Municipal Improvements, to be held at Dayton, O., October 12-15, a very interesting program has been announced for the ladies who are accompanying the delegates. On Tuesday, October 12, the ladies' reception committee, of which Mrs. J. E. Barlow is chairman, will meet the ladies present at the New Miami Hotel at 10:00, take them for a ride about Dayton, then to tea at the home of Mrs. H. M. Waite at 4:00, and to the dinner and entertainment at the Engineers' Club at 7:00. There will be trips to places of engineering interest the following day. On Thursday there will be a trip through the market at 9:00, followed by an inspection of the "Budget Exhibit," lunch, organ recital in the afternoon and theater in the evening.

### International Smoke Prevention Association.

At the annual convention held at Cincinnati September 10, St. Louis was chosen as the place for the 1916 meeting and the following officers were elected: William Hoffman, smoke inspector, St. Louis, president; Charles W. Heath, Cincinnati, vice-president; Frank Chambers, Chicago, secretary and treasurer.

How Chicago keeps the smoke down and effects a saving in coal was demonstrated in a paper read by Roy L. Peck, chief engineer of the Great Lakes Dredge and Dock Company, Chicago, who said: "The first thing we did was to get our boilers in shape and adopted modern smoke preventative devices. Then we started a campaign of education to teach our firemen the principles of smokeless combustion. We also offered a bonus to the fireman who could go for a month without being reported by the smoke inspectors. Framed copies of the rules are posted on each of our machines."

### Northwest Electric Light and Power Association.

The eighth annual convention of the Northwest Electric Light and Power Association was held at Portland, Ore., Sept. 8-11. Advocacy of newspaper advertising and concentrated effort to please customers as essential to the growth and progress of the electrical appliance business were brought out in discussion.

Seattle will probably be chosen for the next convention. The choice of the nominating committee for officers was as follows: E. G. Robinson of Arlington, Wash., general manager of the Jim Creek Water, Light & Power Company, president, succeeding O. B. Coldwell, Portland; vice-president for Washington, H. J. Gille, Seattle, sales manager for the Puget Sound Traction, Light & Power Company; vice-president for Oregon, Atilla Gorman Eugene, of the Oregon Power Company for re-election; vice-president for Idaho, E. P. Bacon, Boise, of the Idaho Power & Light Company; executive committee, M. C. Osborn, Spokane; J. M. Kinkaid, Port Townsend, Wash.; James E. Davidson, Portland (for re-election).

### League of California Municipalities.

The eighth annual convention of the League of California Municipalities held at Oakland September 7-10. Visalia was selected as the place for the next meeting and the following officers were elected:

President, Allen H. Wright, city clerk of San Diego; first vice-president, Wallace Rutherford, city attorney, Napa; second vice-president, Lorin A. Handley, president of the Board of Public Works, Los Angeles; secre-

taries, H. A. Mason, board and ordinance expert of the Board of Supervisors, San Francisco, and W. J. Locke, president of the Bureau of Municipal Reference, Alameda.

The allied bodies of the league also held their election of officers as follows:

Department of City Planning, president, Percy V. Long, city attorney of San Francisco; first vice-president, Fred C. Wheeler, councilman, Los Angeles; second vice-president, Duncan McDuffie, Berkeley City planning commissioner; secretary-treasurer, C. H. Cheney, architect, San Francisco; executive committee, Senator James D. Phelan, San Francisco; Chester H. Rowell, Fresno; A. S. Levenson, Oakland; George L. Dillman, Alameda; W. H. Howerth, Berkeley; H. A. Mason, San Francisco; T. J. Lubin, Sacramento, and Mayor E. J. Gerard, of Richmond.

Department of City Attorneys, president, Howard Robinson, assistant city attorney, Los Angeles; vice-president, F. W. Henderson, city attorney, Merced; secretary, W. J. Locke, Alameda.

Department of Clerks, Auditors and Assessors, president, H. G. Neibling, Marysville; vice-president, Frank Kason, Palo Alto; secretary, Miss E. F. Early, San Mateo.

Department of Health, president, Dr. Wilber A. Sawyer, secretary of the State Board of Health; vice-president, Dr. H. F. Browning, health officer of Hayward; secretary-treasurer, Dr. Ralph L. Taylor, health officer, Long Beach.

Department of Engineers, Councilmen and Street Superintendents, president, James E. Sutton, city engineer, Alameda; secretary, B. E. Cronkite, city engineer, Fresno.

James H. L'Houmedieu, landscape engineer of Oakland, gave an address on "The Laying Out of Subdivisions," urging a city plan and a close adherence to it, as the best method for keeping up each section of the city and its values. As it is now, he said, the good part of the city was made to pay the expenses of the poorer part.

"Expert Administration" formed the topic at a joint session of the engineers' department and the city planning section. Lorin A. Handley, president of the Board of Public Works, Los Angeles, strongly urged the establishment of departments in universities for teaching men the executive work of cities.

A number of the amendments to be voted upon this fall came up for discussion. Among them were the "excess condemnation" measure, which was exploited by Fred C. Wheeler, of Los Angeles, as being the best method ever devised for a city to enjoy the benefit of its own endeavor. He urged all those present to work for the measure.

H. A. Mason, of San Francisco, and Clyde L. Seavey, of the State Tax Commission, discussed the two constitutional amendments relative to taxation and the deposit of public money. Mason declared that amendment 19 would remove the restrictions now governing

the deposit of public money, putting larger amounts into circulation when most needed, while permitting the inactive money to be left for a longer time and at a bigger rate of interest.

Amendment No. 38, which will provide for a change in the method of raising the state taxes, was taken up at length by Seavey, who commended it because instead of an arbitrary decision, he said, it will permit the legislature to work for an equitable method of taxation.

#### League of Iowa Municipalities.

The eighteenth annual meeting of the League of Iowa Municipalities was held at Council Bluffs, September 14-16. The convention was opened Tuesday morning with an address of welcome by Mayor M. B. Snyder. This was followed by the president's address and the reports of the secretary-treasurer and of the committee on legislation. In the afternoon the convention listened to a paper on "Engineering Co-operation for Small Towns," by Prof. R. R. Price, secretary of the League of Minnesota Municipalities. This was followed by a report of the committee on street paving.

Mayor Hanna of Des Moines spoke at the Wednesday afternoon session on "Local Self Government for Municipalities." The work of the league in its efforts to get a home rule bill through the legislature was reviewed at length by him. With the passage of such a measure, said the mayor, would come better governed municipalities.

"The folly of permitting the legislature to attend to all matters affecting only the cities of the state, or perchance a single city of the state, has rapidly grown apparent.

"In the first place the legislators do not have the time to devote to so many questions. In the second place in the Iowa legislature with most of its members from country districts they have no knowledge of the importance of the questions at issue. And finally they are not naturally deeply concerned with questions that do not at all affect their own constituents and so do not care whether they are voted up or down."

Dr. Henry Albert, state bacteriologist at the university at Iowa City, advised all towns and cities to hurry samples of water used to the laboratories of the state university for examination when the first cases of typhoid were discovered in a municipality.

The state bacteriologist took for his subject, "Water Analysis." In his talk he explained the efforts put forth by the state board of health to aid Iowa towns and cities in preventing the spread of epidemics through impure water.

D. C. Faber, of the Iowa State College of Ames, addressed the convention on the "collection and disposal of city refuse."

In his address Faber advised municipalities to either bury or burn their garbage. He recommended the first course, adding that there are now but

130 incinerators in operation in the United States, and many of these, he said, were not proving a success.

Dubuque was selected as the place for the 1916 meeting and the following officers were elected: President, Mayor J. F. Cole, of Oelwein; vice-president, Mayor J. D. Glasgow, of Washington; secretary-treasurer, Frank G. Pierce, Marshalltown, re-elected; trustee, Mayor R. C. Thompson, Waterloo, re-elected.

#### The Municipal Engineers of New York City.

At the regular meeting of the Municipal Engineers of New York City, held at 8.15 p. m., September 22, in the Engineering Societies' Building, a paper entitled "Sewers and Sewage Disposal in New York City" was presented by Mr. Charles E. Gregory, engineer in charge of sewers, Borough of Manhattan, New York City. It was illustrated by lantern slides.

### PERSONALS

Chief Fred H. Wilson of the Jamestown, N. Y., fire department and Frederick S. Peace, Pittsburgh agent of the Gamewell Fire Alarm Telegraph Company, were killed by the overturning of an automobile near Butler, Pa., on September 26. The two were in the machine, on their way from Pittsburgh to Jamestown, when the auto skidded on the road, which was slippery from the rain. Mr. Peace was dead and Chief Wilson died a few minutes later when they were taken from under the machine. Chief Wilson was given a military and civic funeral in Jamestown, city departments and business houses being closed during the services. Mr. Peace's remains were removed to Brooklyn, N. Y., where his family resides.

Chief Wilson was born in Jamestown in 1864. He joined the Jamestown department in 1888 and became chief ten years later. He was a prominent member of the I. A. F. E., being chairman of the exhibit committee in 1912, and of the Firemen's Association of New York State, of which he was a member of the executive committee. He was in the National Guard and a member of many fraternal societies.

Mr. Peace was born in 1877 and at the age of 19 he began his career with the Gamewell company. His rise was rapid, until in 1892 he was placed in charge of the territory embracing Pennsylvania, eastern Ohio, western Maryland, West Virginia and Jamestown, N. Y. He was one of the best-known associate members of the I. A. F. E.

Granzow, Fred, assistant chief of the Duluth, Minn., fire department, was killed in an automobile collision, September 10, while responding to an alarm.

Spaulding, General I., former mayor of Monroe, Mich., died, September 13, at his home at that place.

James, J. W. Harry, a noted civil and mechanical engineer, of recent years connected with the American Bridge Company of Wilmington, Del., died August 29 at his home in Chester, Pa. He was a native of England and came to this country twenty years ago to take charge of mining and engineering operations. Prior to coming here he managed important engineering enterprises in England, France, Russia and India, and among the various government positions he held was that of consulting engineer of the department of public works of the Empire of India.

Heiatt, William, has been elected chief of police of Eminence, Ky.

McKee, B. F., city engineer of Warren, Ohio, has resigned.

Prior, Joseph H., of Chicago, has been appointed chief engineer of the Illinois state public utilities commission.

Gamper, Herman, formerly superintendent of the Columbus, O., municipal light plant, has been retained by that city in the capacity of expert in the electric light rate case.

Gladding, James N., has been appointed city engineer for El Paso, Texas, and Albuquerque, N. M.

Sullivan, John L., has been appointed chief of police of Pittsfield, Mass.

#### State of New York—The Civil Service Commission—October 30, 1915.

Open competitive examinations for the state service will be held in various cities throughout the state, October 30, 1915, for the positions mentioned below:

Assistant Bacteriologist, Quarantine Laboratory, Department of the Health Officer of the Port of New York. Men and women. Salary, \$1,200 per annum.

Assistant Physician, State Charitable and Reformatory Institutions. Men only. Open only to licensed physicians of New York State. At least six months' experience in a general hospital is required. Preferred ages, 25 to 40 years.

Deputy Claim Agent, Bureau of Claims, Department of Public Works. Five positions to be filled. Open to men only. Minimum age, 35 years. Preferred ages, 35 to 50 years. Credit, however, will not be deducted for age between 50 and 60 years, provided candidates are otherwise well qualified. Compensation, \$6 to \$10 per day and traveling expenses during employment.

Engineering Draftsman. \$1,201 to \$1,500. Applicants must have had two years' experience in drafting or engineering work.

Special Agent, Audit Bureau, Office of the State Comptroller. Open to men only. One position. Minimum age, 30 years. Preferred ages, 35 to 50 years. Salary, \$3,000 per annum.

For application blank, address State Civil Service Commission, Albany, N. Y. Applications must be received in the office of the commission on or before October 20. No application blanks will be sent out by mail after October 18.



## NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

### KNOX TRACTOR.

#### Of Special Fire Service Design, and Patented Features.

The latest Knox tractor is the Model 35 four-wheel, especially designed for fire service. Added to the tested construction of earlier models are many exclusive Knox features, such as a differential lock, hydraulic brakes, double spring suspension and others. The advantages of motor traction over horse traction are obvious, and tractorizing has the added benefit of enabling the use of equipment already in service and obviating the sacrifice of the original investment.

The Knox tractor is designed to be able to pull a 5-ton engine at a sustained speed of 35 miles an hour. It is claimed that the tractor has even a shorter turning radius than a team, making operation in crowded traffic unusually easy. The tractor is quickly detachable and may be transferred readily from one piece of apparatus to another. Because of unusual size of the trailer platform the coupling may be done instantly. There is no weakening of the trailing apparatus, the connections made by king bolt and original springs being preserved. The Knox is claimed to have ample power for the steepest grades.

The patented Knox double-spring suspension frees the motor and transmission from jars of load and road. On connection, the rear axle of the tractor becomes the front axle of the trailer and the driving axle of the load, pulling the load behind and pushing the tractor ahead. The load pushed is only 3,800 pounds, while the load pulled may be 15 tons or more.

Flexible cantilever springs support the chassis, power plant and driver, and rugged semi-elliptic springs support the trailer platform of the tractor and the load. The patented hydraulic brakes are claimed to be the largest and most powerful ever built into a gasoline-propelled vehicle and are calculated to develop the highest possible braking efficiency on high speed through congested traffic.

The main specifications follow:

**Power Plant**—Overhead valves, four cylinders, 50 horsepower, three point suspension; cylinders in blocks of two, with Knox water-cooling system, direct cooled valves without valve cages; cylinder heads easily removable, water leaks impossible.

**Crank Case**—Upper half a one-piece casting of aluminum, containing all mechanism; lower half a one-piece casting of aluminum, constituting oil pan or reservoir of motor; large accessible oil screen; crank shaft of high-grade steel forging, drilled for forced high pressure lubrication; cam shaft of one solid piece drop forged nickel steel.

**Bearings**—Specially prepared, high grade bearing material, backed by bronze.

**Valves**—At top of head; diameter, 2¼ inches; in clear, 2 inches; tungsten steel.

**Pistons**—Special semi-steel, heat treated and tested.

**Lubrication**—Oil supplied under high pressure from gear pump of large size.

**Starting and Lighting**—Bijur starting and lighting system of highest grade; 6-volt current used.

**Ignition**—Bosch duplex.

**Cooling**—Water circulated by large centrifugal pump driven direct from

three timing gears; distributor at back of radiator gives maximum cooling efficiency; fan belt.

**Carburetion**—Zenith carburetor; hot water jacket manifold.

**Clutch**—Three-plate type, requiring no lubrication; runs dry and operates smoothly.

**Transmission**—Selective type, three speeds forward and reverse, of heavy construction, with large double row ball bearings; equipped with differential lock of ingenious design to destroy action of differential when traction is lost on one driving wheel; drive is by side chains.

**Brakes**—Large and heavy; jack shaft brakes have cooling ribs on drums; brakes on rear wheels operated by hydraulic mechanism.

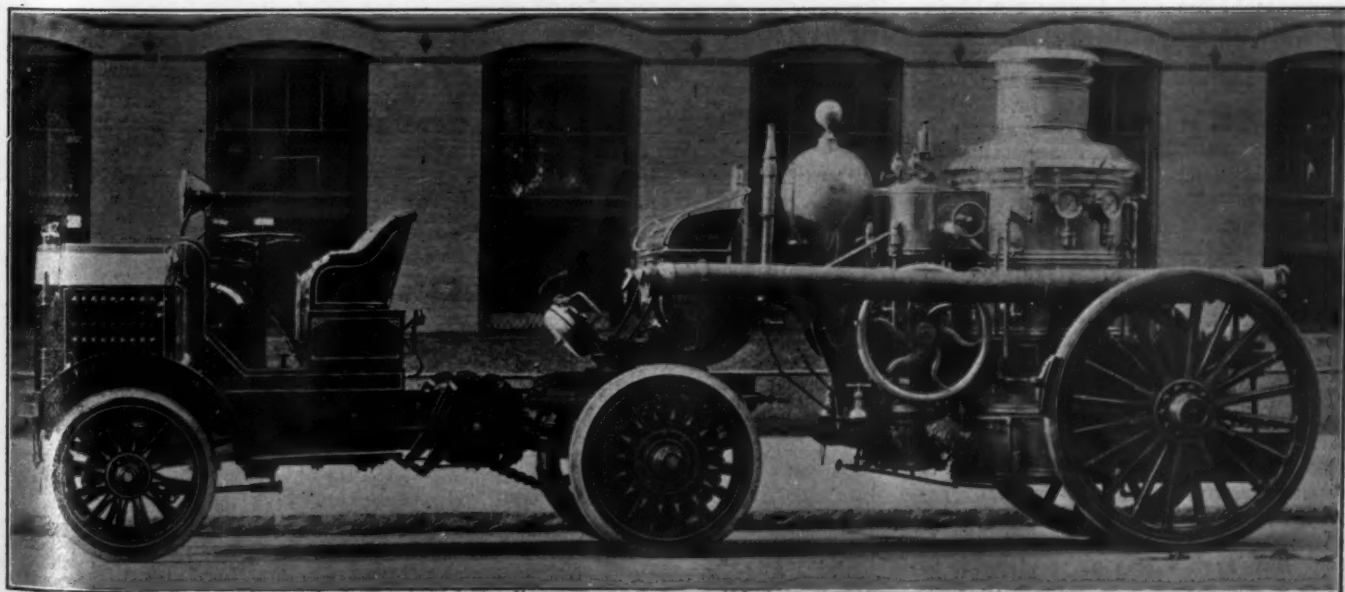
**Steering**—Vertical steering column located on the left hand side.

**Frame**—Five-inch Carnegie rolled steel, drilled and hot riveted, braced with cross and lateral members and large gusset plates at corner; wheel-base, 108½ inches; axles, front made from drop-forged steel with I-beam section, 3 by 3¾ inches, of heavy design, allowing tractor to turn in 31-foot circle; rear, drop-forged nickel steel, 2¾ by 4¾ inches.

**Tires**—Front wheels, 36 by 4 inches; rear, 38 by 6 inches, dual, or 40 by 6 inches single, solid rubber, continuous or "pressed on" type; options offered.

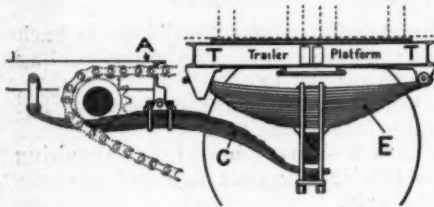
**Trailer Platform**—Supported on springs; constructed of heavy channel steel, well braced, with a flat piece and a heavy center socket for the pin of the trailer; upper and lower bolster plates included in trailer platform construction.

**Standard Equipment**—Trailer plat-



KNOX TRACTOR CONNECTED TO STEAMER.

form complete; two electric side lamps, one electric tail lamp, one dash and electric searchlight; storage battery; complete set of tools; electric siren; Pyrene fire extinguisher; speedometer; extras.



SUSPENSION OF TRAILER PLATFORM.

The accompanying illustrations show a Knox tractor and steamer and two views of the Knox patented double-spring suspension. This tractor is made by the Knox Motors Associates, Springfield, Mass.

### ROAD MACHINERY.

#### Grading and Ditching Machine—Road Drag.

##### GLIDE DITCHER AND GRADER.

The Glide grader-ditcher-land leveler is really a general utility machine designed for various purposes in improving and cleaning roads. In addition to being used for grading and ditching it is in service for land leveling, filling and cleaning ditches, removing snow and spreading crushed rock.

The No. 1 Glide consists of a steel frame supported on four wheels and carrying a curved blade. The frame is all steel, 8 feet long and 30 inches above ground, giving plenty of clearance to avoid clogging and to allow maximum vertical adjustment of the blade. The wheels are attached to the extreme ends of the frame, giving unusual wheel base for a machine of this size and preventing the rear wheels from dropping into cross ditches or washouts in the road before the blade has entirely cleared them. The rear axle is of steel,  $1\frac{1}{2}$  inches in diameter and 5 feet long. The rear of the frame is so attached that it can be shifted on the axle, permitting the wheel to follow cut of blade or run outside of cutting point, as desired. The rear wheels are 20 inches in diameter and the front 16. The rims are flanged to prevent skidding and are of heavy construction to resist side strain and to need little attention. The front axle is pivoted. All wheels are fitted with compressed oil or grease cups and bearings are protected from dust and dirt by flanged collars.

The blade is a single piece of high carbon plow steel,  $\frac{1}{4}$  inch thick, 12 inches wide and 5 feet long. It is ground on both edges and is easily replaced at low cost after being reground a number of times. The blade is curved in such a way as to allow it to handle the maximum amount of dirt. The curved blade reduces the draft and side pressure. Direct lever connection

with the blade permits the operator to raise and lower it instantly. The levers are conveniently located. The blade is easily reversed, it being locked in position simply by a strong steel pin which passes through the blade and fastens it to the stationary circle. To reverse, the operator releases the pin by means of a foot latch, the forward point of the blade is then put into the ground and the team started, thus shifting or reversing the blade, and then it is locked by a spring foot lever. The leveling fenders are of steel, 12 inches high and 24 inches long, and are for use where dirt has to be moved for a distance.

The No. 1 Glide can be operated easily by one man and a team. The draft is direct, the hitch being direct to the drawbar and in perfect line with it.

The No. 3 Glide is similar, only heavier. While this is a four-horse machine, one good team can operate it on light work. In difficult soil four or six horses are used—an extra seat being provided for driver. As in No. 1, no gray iron is used in its construction. The No. 3 is  $8\frac{1}{2}$  feet long, 3 feet wide and 3 feet above ground. The rear axles are adjustable, allowing either wheel to be run in or out 16 inches beyond the frame. In working narrow roadways, both wheels can be set close to the frame. Rear wheels are 24 inches in diameter and front 20. The blade is  $\frac{1}{4}$  inch thick, 14 inches wide and 6 feet long.

##### GLIDE ROAD DRAG.

The Glide adjustable steel road drag is made in two sizes: No. 5, weighing 375 pounds, and No. 6, weighing 340 pounds. In either size the drag is all steel and the blade is of carbon steel,  $\frac{1}{4}$  inch thick and 8 feet long. The footboards are  $\frac{1}{4}$  inch thick.

In No. 5, the frame and ends are  $3 \times 3 \times \frac{1}{4}$  angle iron. Rivets are used on blades. All bolts are in bearings for tilting, surrounded by bearing sleeves, making levers easy to operate.

In No. 6 the frame and ends are  $2\frac{1}{2} \times 2\frac{1}{2}$  angle iron. In both sizes all corner braces connecting blades with frame are of heavy  $\frac{3}{8}$  forged steel. Either size may be had 7 or 8 feet long.

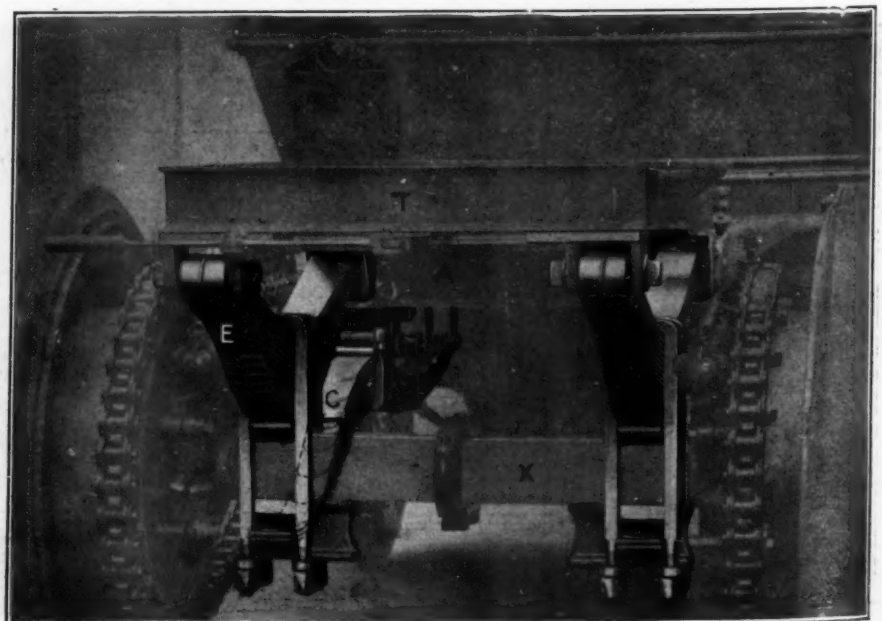
The cuts on the next page show a No. 3 grader and ditcher and a No. 6 drag. They are made by the Glide Road Machine Company, 501 Huron street, S. E., Minneapolis, Minn.

## INDUSTRIAL NEWS

**Cast Iron Pipe.**—Chicago—A part of the outstanding municipal tonnage has been closed by contractors, including 300 tons at St. Charles, Ill., but new orders to pipe makers are unimportant. Quotations: 4-inch, \$27; 6-inch and up, \$25; class A, \$1 extra. Birmingham—The pipe market has not been featured by large new contracts with the exception of one for 1,000 tons for Kansas City. Operations continue around 80 per cent. in the active shops. Pipe has been marked up another 50 cents per ton and may go higher. Quotations: 4-inch, \$22; 6-inch and up, \$20. New York—Jersey City, N. J., will require 2,000 tons of 48-inch pipe and will receive alternate bids for flexible joint and bell and spigot. A contract will be let for laying, and the contractor will purchase the pipe. Another contractor's job is being let at Coatesville, Pa., Oct. 7, involving the purchase of 396 tons of 6, 8 and 10-inch. The leading interest has been awarded the contract for 350 tons for Colon, Panama. Quotations. 6-inch, Class B and heavier, \$24.50 to \$25 per net ton; Class A, \$25.50 to \$26.

**Lead.**—Lead is stronger, but quiet. Quotations: New York, \$4.50; St. Louis, \$4.425.

**The Milton Brick Company's** works at Milton, Northumberland county, Pa., have been declared by efficiency



DOUBLE SPRING SUSPENSION IN KNOX TRACTOR.



engineers and brick manufacturers to be one of the best equipped and most modern paving and building brick plants in the country. The plant has a capacity per day of 50,000 red shale paving block and nearly 100,000 rough texture or plain face wire-cut builders' and sewer brick, and with its highly efficient methods of manufacture it is producing its output at the least possible cost to its owners, insuring a product to its customers at a comparatively low price. Located 66 miles northwest of Harrisburg, on the Buffalo division of the Pennsylvania and Reading railroads, it has low freight rates and quick deliveries to all eastern markets and north and south along the Atlantic coast.

Although in operation less than two years, the brick manufactured by the Milton Brick Company has interested engineers and contractors who have used them because of the low testing qualities of the paving blocks and the evenness in color and density and waterproof qualities of the builders', both of which have stood all highway and municipal tests.

The officers of the Milton Brick Company are: William Scully, New York, president, and Frank Oberkirch, St. Marys, Pa., vice-president. Mr. Oberkirch is also president of the St. Marys Sewer Pipe Company, St. Marys, Pa., and the Pennsylvania Clay Products Company, West Winfield, Pa., and is a sewer pipe manufacturer of national reputation. Lyle G. Hall, son of the late United States Congressman and State Senator J. K. P. Hall, of St. Marys, Pa., is the secretary and treasurer of the company. William C. Hartford, of Milton, Pa., a veteran in the manufacture of brick and sewer pipe, is manager of the plant. The owners of the Milton Brick Company have been in the clay manufacturing business for almost 35 years.

The New York sales office of the Milton Brick Company is in the Marble Bridge Building, 47 West 34th street,

room 704, and the Philadelphia office is in the Perry Building.

An invitation to visit these model works is extended all engineers and others interested in the manufacture of paving or building brick.

**Exhibition of Street Cleaning Appliances.**—The second exhibition of street cleaning and garbage handling appliances will be held under the auspices



GLIDE GRADER AND DITCHER.

of the Street Cleaning Department of the City of New York during the week of October 11 to 16, at the Field Artillery Armory at 68th street and Broadway. There will be a "street cleaning parade" on October 9. The exhibition last year was very successful.

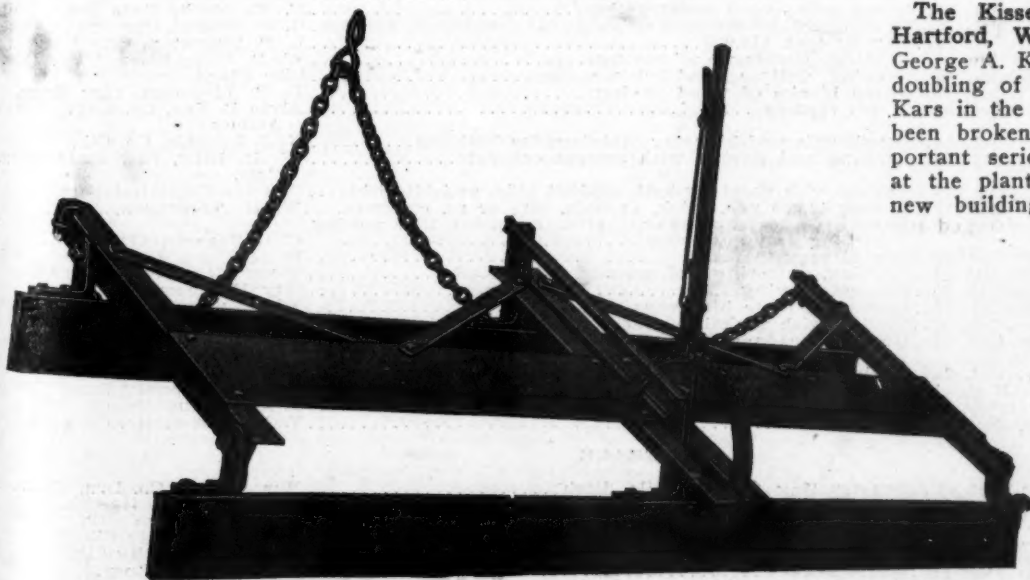
**The Tiffin Wagon Co., Tiffin, O.,** is to have an interesting exhibit in the Exhibition of Street Cleaning Appliances in New York. It will display street flushing machines and sprinklers, both horse-drawn and motor-driven, from the smallest machine to the big 6-ton, 6-cylinder motor-driven machine with electric starting and lighting system. The four models of auto flushers, all designed within the past year, together with auto and horse-drawn power motor pressure machines, will constitute a complete and up-to-date line of appliances.

**The Firestone Tire & Rubber Co., Akron, O.,** has just issued an interesting book, "Mileage Talks," explaining the factors on which tire mileage depend. The book has some interesting facts on tire construction and the

careful means used to obtain durability. An interesting detailed description with photographs is given of the various processes that take place from the crude rubber stage to the finished tire. There is an explanation of the Non-Skid tread. Rims and tubes and accessories are also given space in this book.

**James B. Clow & Sons, Harrison Street Bridge, Chicago, Ill.,** have just issued a very striking catalogue of their products, entitled "Wasting a Million a Day—How to Save It." The theme of the book is the prevention of water waste by the use of Clow products, such as cast-iron pipe, toilet fixtures, fountains, valves, specials, hydrants, etc. Water heaters, lighting posts and other foundry products are described and well illustrated in this useful catalogue.

**The Kissel Motor Car Company, Hartford, Wis.,** announces President George A. Kissel, is preparing for the doubling of its production of Kissel-Kars in the near future. Ground has been broken for the first of an important series of building operations at the plant of the company. Two new buildings are started, one for storage and shipping, and one for the enameling department. The former is to be 100 feet long and the other 110 feet long, each being 35 feet in width. The third structure, soon to be started, is a modern four-story office building, which will house all of the executive and clerical forces of the company, including the cost and drafting departments.



GLIDE STEEL ADJUSTABLE ROAD DRAG.

# ADVANCE CONTRACT NEWS

## ADVANCED INFORMATION BIDS ASKED FOR

## CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

### BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
<b>STREETS AND ROADS</b>				
Wis., Racine	.....10 a.m., Oct.	9..	4,491 yds. brick or asphalt pav. & 2,926 ft. combined curb and gutter; 2,268 yds. brick paving	P. H. Connolly, Chr. B. P. W.
Ind., Noblesville	.....10 a.m., Oct.	9..	Constructing concrete road	W. O. Horton, Co. Aud.
Ind., Logansport	.....Oct.	9..	43,540 yds. pavement	Wm. Pickett, City Clk.
O., Mt. Vernon	.....Noon, Oct.	9..	Grading, draining and improving	City Engineer
Va., Monterey	.....Oct.	10..	Macadamizing	J. M. Coland, Mayor.
W. Va., Moundsville	.....Oct.	11..	Brick paving and cement curb	A. Purdy, City Engr.
Mich., Brighton	.....Oct.	11..	6 1/2 miles trunk road	Burt Beurmann, Hwy. Comr.
Colo., Lamar	.....noon, Oct.	11..	Grading and surfacing with gravel or shale	L. M. Markham, Co. Clk.
Ia., Council Bluffs	.....Oct.	11..	Combined curb and gutter	C. J. Duff, City Clk.
Minn., St. Paul	.....10.30 a.m., Oct.	11..	Grading and improving	A. Hohenstein, Pur. Agt.
N. J., N. Brunswick	.....2.30 p.m., Oct.	11..	Constructing South Amboy-Keyport road	A. E. Fox, Eng., Perth Amboy.
Wash., Olympia	.....Oct.	11..	Grading, draining and surfacing seven miles of road; surfacing 17.3 miles with gravel	W. R. Roy, State Hwy. Comr.
N. J., Newark	.....2.30 p.m., Oct.	11..	Improving road	F. A. Reimer, Boro. Engr.
N. J., Irvington	.....2 p.m., Oct.	11..	Paving	Frederick A. Reimer, Co. Engr., Newark
Cal., Los Angeles	.....2 p.m., Oct.	11..	Road improvements	H. J. Lelande, Clk. Bd. Co. Supv.
Ind., Hammond	.....10 a.m., Oct.	11..	Cement curb	Board of Public Works.
Md., Salisbury	.....Noon, Oct.	12..	Two miles state aid highway	H. M. Clark, Rd. Engr.
Ind., So. Bend	.....10 a.m., Oct.	12..	Grading, curbing, paving and improvements	Dept. Public Works
Ill., Chicago Heights	.....2 p.m., Oct.	12..	Grading, paving and curbing	City Clerk.
Miss., Columbus	.....Oct.	13..	51 1/2 miles macadam road grading, draining and surfacing	Gus E. Hauser, Jr. Con. Eng Highway Comm.
N. J., Hoboken	.....10 a.m., Oct.	13..	Street improvements	City Commissioners.
Md., Baltimore	.....11 a.m., Oct.	13..	Grading, curbing and paving with sheet asphalt, vit. blk. and granite blk., all on concrete base	R. K. Compton, Ch. Pav. Com.
Ill., Des Plaines	.....Oct.	13..	4,500 yds. one-course reinforced concrete paving	Central Bur. of Con. Engrs., 1403 Harris Trust Bldg., Chicago.
Neb., David City	.....8 p.m., Oct.	13..	Constructing and reconstructing sidewalk	R. B. Sweeney, City Clk.
O., Akron	.....Noon, Oct.	13..	Brick sidewalks; also paving with creosoted blk., grading, etc.	C. P. Parker, Dir. P. S.
N. J., Jersey City	.....2 p.m., Oct.	13..	5,000 cu. yds. broken trap rock, 500 bbls. Alpha or Atlas portland cement, w. 1. pipe, malleable iron resting and malleable iron posts for fence for Bayonne Park, 22,550 lin. ft. galv. wrought iron pipe and fittings for North Bergen	Walter G. Muirhead, Secy., Hudson Co. Pk. Comrs.
Del., Wilmington	.....Noon, Oct.	14..	Improving stone road	James Wilson, Newcastle Co. Hwy. Comr.
N. Y., New York	.....10.30 a.m., Oct.	14..	Regulating, grading, curbing, sidewalks, crosswalks, etc.	Douglas Mathewson, Boro. Pres., Bronx.
Ind., New Albany	.....10 a.m., Oct.	14..	Two miles road	J. C. Miller, Co. Aud.
Del., Wilmington	.....noon, Oct.	14..	Improving 7,500 ft. of road	Jas. Wilson, State Hwy. Comr.
Ind., Hartford City	.....7 p.m., Oct.	15..	Sidewalk improvement and construction	Edwin McEldowney, City Clk.
Ida., Boise	.....Oct.	15..	Seven miles road construction	E. M. Booth, State Hwy. Eng.
Tenn., Newport	.....Oct.	16..	Grading and macadamizing road; nine contracts, \$150,900	G. W. Gorrell, Chr. Pike Comrs.
Fla., Pensacola	.....Oct.	16..	Paving cost \$10,000	L. E. Thornton, City Eng.
W. Va., Adamston	.....7.30 p.m., Oct.	16..	Grading, curbing and paving	W. B. Hutchinson, Twn. Rec. City Clerk.
Wis., Tomah	.....10 a.m., Oct.	16..	Grading, draining and brick paving	L. E. Thornton, City Engr.
Fla., Pensacola	.....Oct.	17..	Three blocks of wood paving	Alvin B. Fox, Co. Engr., Perth Amboy.
N. J., New Brunswick	.....Oct.	18..	Street repairs	H. J. Lelande, Co. Clk.
Cal., Los Angeles	.....2 p.m., Oct.	18..	Construction of highway maintenance building	W. R. Ellis, Sec. State Hwy. Com.
Cal., Sacramento	.....2 p.m., Oct.	18..	Grading and paving with cement concrete	District Commissioners.
D. C., Washington	.....Oct.	19..	Paving with sheet asphalt, asphalt blks. and bitulithic	W. H. Thompson, Engr.
Ind., Logansport	.....Oct.	19..	Laying 42,000 yds. brick, asphalt, bit., or re. concrete	C. L. Scherer, City Engr.
Tex., Beaumont	.....10 a.m., Oct.	19..	90,000 yds. brick, asphalt, bitu. or wood blk. paving, curbing and guttering	H. L. Knox, Johnson Co. Aud.
Ind., Franklin	.....2.30 p.m., Oct.	20..	Gravel road	Town Clerk, West Warwick.
R. I., Providence	.....5 p.m., Oct.	21..	Curbing, guttering and macadamizing road	City Engineer.
Utah, Salt Lake City	.....Noon, Oct.	21..	Concrete paving	Edw. Duffey, State Hwy. Com.
N. Y., Albany	.....1 p.m., Oct.	26..	Improving state highways	H. E. Wells, Clk. Lancaster Co.
Neb., Lincoln	.....2 p.m., Oct.	27..	Paving with asphaltic concrete, repressed brick, etc.	M. W. Raley, Sec. Rd. Comrs.
Tex., Terrell	.....2 p.m., Oct.	28..	Gravel macadam roads	First Nat. Bank.
O., Granville	.....Oct.	28..	Paving with brick or sheet asphalt	R. E. Morrow, Vil. Clk.
Cal., Santa Barbara	.....Nov.	1..	Paving to cost \$17,689	Board of County Supervisors.
Ind., Columbia City	.....2.30 p.m., Nov.	5..	Three highways	T. A. McLaughlin, Co. Aud.
Ind., Columbia City	.....1 p.m., Nov.	5..	Road	T. A. McLaughlin, Co. Aud.
<b>SEWERAGE</b>				
Ind., Kokomo	.....2 p.m., Oct.	9..	Constructing 6,488 ft. tile ditch	Wm. Kerby, Co. Drn. Comr.
Iowa, Oakland	.....Oct.	10..	13,300 ft. 8 to 15-in. sewers	E. M. Wends, City Clk.
Colo., Edgewater	.....Oct.	10..	Sewer system to cost \$32,000	G. W. Gist, Twn. Clk.
Wash., Roslyn	.....Oct.	11..	Sewer improvements	G. G. Wake, City Clk.
Ia., Council Bluffs	.....Oct.	11..	8-in. and 6-in. sewers	Chas. J. Duff, City Clk.
Tex., Houston	.....2 p.m., Oct.	11..	Storm sewers	E. Sands, City Engr.
R. I., Providence	.....2.15 p.m., Oct.	11..	Sewer construction	City Engineer
Minn., St. Paul	.....10.30 a.m., Oct.	11..	Sewer construction	A. Hohenstein, Pur. Agt.
N. D., Bismarck	.....8 p.m., Oct.	11..	Sewer construction	City Engineer.



## BIDS ASKED FOR

STATE	CITY	RECD UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
La.,	Oakland	Oct. 12.	10,000 ft. 8-in., 1,500 ft. 10-in. sewers, T's and manholes.	E. F. Wentz, City Clk.
La.,	Denison	7.30 p.m., Oct. 12.	Sanitary sewers	E. F. Tucker, City Clk.
Ont.,	Toronto	noon, Oct. 12.	Furnishing 35-in. stop valve and special castings for pumping station	E. L. Church, Mayor
Cal.,	Compton	8 p.m., Oct. 12.	Sanitary sewer system	Olmsted & Gillelen, Hollingsworth Bldg., Los Angeles
N. C.,	Hertford	2.30 p.m., Oct. 12.	Wtr. wks. & sanitary sewer const., includ. pumps, motor, 60,000-gal. steel tank, hydrants, gate valves, pipe, etc.	J. B. McCrary Co., Engr., 3d Nat. Bk. Bldg., Atlanta, Ga.
N. J.,	Trenton	2.30 p.m., Oct. 13.	Sewers	City Engineer
O.,	Cheviot	Noon, Oct. 13.	Trunk sewer	A. J. Reussing, VII. Clk.
Md.,	Baltimore	Oct. 13.	Sand bed and concrete channel at sewage disposal works	Chas. England, Chr. Comm.
Ind.,	Hammond	10 a.m., Oct. 13.	15-in. vit. socket sewer with manholes, etc.	Board Public Works
Mich.,	Gladwin	8 p.m., Oct. 13.	½ mile sewer construction	Harold W. Wager, City Clk.
N. Y.,	New York	11 a.m., Oct. 14.	Sewer construction	L. H. Pounds, Boro. Pres., Bklyn.
Wis.,	Ashland	9 a.m., Oct. 14.	8-inch sewers, manholes and appurtenances	C. J. Wadak, City Engr.
N. C.,	Albemarle	Oct. 15.	Four miles 6 to 20-in. vit. and c. i. sewer	M. J. Harris, Mayor.
Wis.,	Appleton	9 a.m., Oct. 15.	Sewer	E. L. Williams, City Clk.
Ind.,	E. Chicago	1.30 p.m., Oct. 15.	Main sewer	T. Y. Richards, City Clk.
Ind.,	Logansport	10 a.m., Oct. 19.	Sewer construction	Board Public Works
Tex.,	Beaumont	10 a.m., Oct. 19.	40,000 ft. 6 to 18-in. sewer construction	C. L. Scherer, City Engr.
Ind.,	Hartford City	2 p.m., Oct. 20.	Furn. 5,515 ft. 12 to 20-in. tile and const. ditch	F. P. Wallace, Co. Surv.
Ill.,	Upper Alton	2 p.m., Oct. 25.	Sewers and tunnel work at State Hospital	J. B. Dibelka, State Architect, 130 N. 5th Ave., Chicago.
Wis.,	Ripon	4 p.m., Nov. 5.	635 ft. 8-in. sewer	Jay E. Carter, City Clk.
<b>WATER SUPPLY</b>				
Wis.,	Oshkosh	2 p.m., Oct. 11.	200 bags filter alum	Board Public Works
D. C.,	Washington	Oct. 11.	Steam turbine-driven 5,000,000 gal. centrifugal pump	District Commissioners.
Ind.,	Monticello	Oct. 12.	Two Duplex pumps, valves, etc.	F. L. Miner, City Clk.
Ont.,	Toronto	Oct. 12.	35-in. stop valves, operating mechanism and special castings.	T. L. Church, Mayor.
N. C.,	Lumberton	Oct. 12.	Filters, coagulating basin and pumps	Gilbert C. White, Engineer, Charlotte
D. C.,	Washington	Oct. 12.	Air pumps, valves, etc.	Bureau of Supplies & Accts., Navy Dept.
Ill.,	Poplar Grove	11 a.m., Oct. 12.	Pump. sta., motor, air compressor, c. i. water mains, hydrants, valves, etc.	R. S. Renne, VII. Clk.
Man.,	The Narrows	2 p.m., Oct. 12.	Improvement to water system	H. H. Elliott, Twn. Clerk
O.,	Cleveland	noon, Oct. 13.	Conduit and insulation for underground steel mains for filtration plant at pumping station	A. R. Callow, Comr. P. & S.
Tex.,	Galveston	Noon, Oct. 14.	3,600 ft. 30-in. submerged cast-iron water mains	Board of City Comrs.
Kan.,	Attila	4 p.m., Oct. 14.	16,200 ft. 4-in., 6-in., and 8-in. c. i. pipe and well	J. C. McCaddon, City Clk.
La.,	Marshalltown	Oct. 15.	Pumps for water works	City Clerk.
La.,	Kanawha	2 p.m., Oct. 15.	30,000-gal. steel tank on 80-ft. tower & 7,000 ft. 4 to 8-in. water mains	C. P. Chase, Engr., Clinton
N. Y.,	New York	11 a.m., Oct. 19.	Two steel frame buildings covered with galvanized steel for drainage chambers of Catskill aqueduct tunnel	Board of Water Supply
Ind.,	Miller	Oct. 20.	Constructing water works system; cost, \$14,000	Town Council
W. Va.,	Clarksburg	Oct. 21.	Two gas engines and two pumps	G. W. Fuller, Engr., 170 Broadway, N. Y.
Mich.,	Three Rivers	1 p.m., Oct. 21.	Water works and lighting plant, including 2 water wheels and generators, motor-driven centrifugal service pump, centrifugal fire pump and elevated steel tank of 150,000 gals. capacity	E. A. Schall, City Clerk.
O.,	Belleville	Nov. 3.	Deep well pump, has engine, 5 miles of main and storage reservoir	Smith & Boulay, Nasby Bldg., Toledo.
<b>LIGHTING AND POWER</b>				
Kan.,	Lawrence	5 p.m., Oct. 11.	White Way of 80 standards	City Engineer
N. C.,	Lumberton	Oct. 12.	Elec. light impts., includ. 6 miles transmission line, series tungsten street lamps, switchboard & transformers, pumps, filters & water works machinery	Gilbert C. White, Engr., Charlotte, N. C.
N. C.,	Hickory	Oct. 12.	Lighting streets and operating electric plant	S. C. Cornwell, City Mgr.
N. Y.,	Fort H. G. Wright	Oct. 12.	Underground street lighting system	Constructing Quartermaster.
La.,	New Orleans	8 p.m., Oct. 13.	One 100 kw. and one 200 kw. motor generator set	Ford, Bacon & Davis, 921 Canal St.
Neb.,	Blair	1.30 p.m., Oct. 15.	Electric light plant, to cost \$35,000	S. W. Chambers, VII. Clk.
Mo.,	Slater	Oct. 20.	20 kva., 60-cycle, 3-phase, 2,300-volt alternator with exciter, directly connected to a 300 h.p. engine	J. A. Stearn, City Clk.
Mich.,	Three Rivers	1 p.m., Oct. 21.	Lighting plant constructed	E. A. Schall, City Clk.
D. C.,	Washington	10 a.m., Nov. 17.	Central light and power plant	Supervising Architect.
<b>FIRE EQUIPMENT</b>				
D. C.,	Washington	2 p.m., Oct. 15.	35,000 ft. cotton-covered rubber-lined 2½-in. fire hose	Pur. Off., 220 Dist. Bldg.
Del.,	Wilmington	Oct. 15.	Fire alarm and police signal system	Chief of Police.
<b>BRIDGES</b>				
O.,	Wapakoneta	10 a.m., Oct. 9.	Two concrete arches at bridge ends	F. W. Langhorst, Co. Aud.
Ind.,	Richmond	11 a.m., Oct. 9.	Constructing bridge	L. S. Bowman, Co. Aud.
O.,	Cleveland	11 a.m., Oct. 9.	Bridge work	W. H. Stinchcomb, Co. Engr.
Minn.,	Springfield	1 p.m., Oct. 9.	Steel and concrete bridge	Chas. L. Palmer, Co. Com.
N. Y.,	Fort Edward	2 p.m., Oct. 9.	Bridge over Hudson River	Alfred Case, Jr., Twn. Supt.
Ind.,	Crown Point	10 a.m., Oct. 10.	Pony truss bridge	E. Simon, Lake Co. Aud.
Ala.,	Mobile	10 a.m., Oct. 11.	Constructing creosoted wooden bridge	O. A. Alvarez, Clk. Revenue & Rd. Comm.
Conn.,	Hartford	noon, Oct. 11.	Superstructure for several bridges	State Highway Commission
Fla.,	Arcadia	Oct. 11.	Construction of bridges	A. L. Durrance, Clk. Co. Comrs
Kan.,	Wichita	Oct. 11.	Four concrete and steel bridges	E. V. Moore, Co. Engr.
Kan.,	Washington	Oct. 12.	Bridge and three superstructures	E. V. McKelvey, Clk. Co. Coms.
Ill.,	Mt. Sterling	Oct. 12.	Reinforced concrete bridge	W. L. Grover, Co. Supt.
La.,	Waukon	Oct. 12.	Constructing one 80-ft., one 140-ft. and two 100-ft. trusses	H. O. Orr, Co. Engr.
Ind.,	Bedford	1 p.m., Oct. 12.	Constructing two bridges	E. W. Edwards, Co. Aud.
S. C.,	Beaufort	Oct. 12.	Repairing two piers of bridge and constructing 120-ft. span steel or concrete bridge	W. H. Hull, Sec. Co. Comrs.
Pa.,	Harrisburg	10 a.m., Oct. 13.	Double 26-ft. span concrete bridge	R. J. Cunningham, State Hwy. Commissioner
Cal.,	Eureka	Oct. 13.	Trestle bridge and reinforced concrete culvert	Co. Supervisors.
Ill.,	Quincy	Oct. 15.	Reinforced concrete bridge	L. L. Boyer, Co. Supt.
Ohio,	Steubenville	2 p.m., Oct. 15.	Constructing steel and reinforced concrete bridges	J. L. Means, Co. Aud.
Okla.,	Walter	Oct. 15.	Bridge	T. J. Huff, Co. Clk.
Ind.,	Dayton	Oct. 18.	Steel and concrete bridge	G. W. Baxter, Tippecanoe Co. Aud., LaFayette

## BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind., Lebanon		Oct. 18.	Two reinforced concrete bridges and repair one.	D. M. Clark, Co. Aud.
Cal., Los Angeles		Oct. 18.	Four bridges	H. J. Lelande, Clk. Co. Bd. Supv.
N. J., N. Brunswick		2.30 p.m., Oct. 18.	Reinforced concrete slab bridge.	A. B. Fox, Co. Engrs., Perth Amboy.
Neb., Lincoln		Oct. 22.	Bridge	H. E. Wells, Lancaster Co. Clk.
Kan., Concordia		Oct. 25.	Eleven reinforced concrete bridges.	Geo. C. Guilbert, Co. Clk.
Ind., Indianapolis		10 a.m., Oct. 25.	Culvert construction	W. T. Patten, Marion Co. Aud.
Pa., Glenfield		Oct. 27.	Reconstructing steel and concrete bidge.	W. N. Kratzer, Burgess.
Ill., Rockford		Oct. 29.	Steel bridge with concrete floors and abutments.	A. R. Carter, Co. Supt. County Commissioners
O., Lima		noon, Oct. 29.	Bridge construction	County Commissioners
Tex., Dallas		10 a.m., Oct. 30.	Viaduct to cost \$135,000.	County Commissioners

## MISCELLANEOUS

Mich., Saginaw		Oct. 12.	Police signal system.	H. F. Paddock, Comr. Health & Safety
N. D., Fargo		10 a.m., Oct. 13.	Motor-driven street flushing machine.	A. R. Watkins, Co. Aud.
N. Y., New York		2 p.m., Oct. 14.	Drainage, water supply and repairs to public market.	M. M. Marks, Boro. Pres.
D. C., Washington		Oct. 19.	Constructing post office at Norton, Va.	Supv. Architect
Pa., Philadelphia		Noon, Oct. 19.	26,624 ft. 2-track elevated railway.	A. M. Taylor, Dir. City Transit.
N. J., Newark		Oct. 21.	Collecting garbage for five years.	City Clerk

## STREETS AND ROADS

**Douglas, Ariz.**—Estimates on proposed new roads of Graham county, for which people will be asked to vote bond issue, have been completed and are now in hands of board of supervisors. A main highway through valley connecting with San Carlos road, at one end, and El Paso route at other, and building of bridge across Gila river at Solomonville are first considerations, and to that end board of supervisors is now working. It is stated upon good authority that bond issue of \$200,000 which is proposed will carry by big majority.

**Phoenix, Ariz.**—Ordinance has been passed adopting plans for improvement of Jefferson street from the east line of Seventh Ave. to east line of Nineteenth Ave. Also ordinance adopting plans for improvement of First St. from north line of Adams St. to south line of Culver St.

**Phoenix, Ariz.**—Two counties will vote on propositions to issue bonds aggregating over half a million for good roads next month. Pima county proposes to vote \$400,000 for better highways, and will decide the question Oct. 26. If the amount is voted \$300,000 will be distributed among the various county roads, and \$100,000 expended on the Mt. Lemmon road from Tucson to that resort, a stretch of forty miles. In Santa Cruz county, where the needs of all sections have been considered, a \$150,000 bond issue is proposed. The election will be held Oct. 23. Yuma county has announced the apportionment of \$110,000 for improvement of 110 miles of Borderland highway within its borders, thus insuring fine road from Colorado to Maricopa county line. Pinal, Pima and Cochise counties are already at work or have plans under way for improving the Borderland. In Gila county, where bond issue of \$500,000 recently voted was pronounced illegal, owing to technicality, arrangements are being made to call another election at early date.

**Tucson, Ariz.**—Tuesday, October 26, was date set for calling of election to vote on proposed bond issue of \$400,000 for construction of Mount Lemmon road and county roads, at meeting of board of supervisors. County Attorney Hillzinger was present at meeting and presented necessary documents for calling of election. Bonds are divided into two lots, \$100,000 for Mount Lemmon road and \$300,000 for county roads.

**Lincoln, Cal.**—State Highway Commission has asked for bids for state highway work in Placer and Sonoma Counties. In Placer County a 9-mile unit from Lincoln to northern boundary of county will be constructed. In Sonoma County 4.2 miles, from Fairville to Reclamation, will be graded.

**Los Angeles, Cal.**—Board of County Supervisors decided to submit to voters at special state election, Oct. 25, a bond issue of \$2,800,000 for road improvements.

**Sacramento, Cal.**—Assemblyman C. C. McCray, of Redding, Shasta County, representing Third Assembly District, is in Sacramento working on two state highway proposals which are of interest to Shasta, Trinity and Modoc counties. McCray is endeavoring to get state to commit itself to construction of "county seat connecting laterals," connecting Weav-

erville, county seat of Trinity, with Redding, county seat of Shasta, and connecting Alturas, county seat of Modoc, with Redding. One of roads would be outlet for Trinity County into Sacramento Valley, and other for Modoc County.

**San Francisco, Cal.**—Board of Works has initiated proceedings for improvement of 19th Ave., between Vicente and Wawona Sts., cost being estimated at \$8,000, and for paving of Beach St. from Hyde to Columbus Ave., at cost of \$4,050. Geary St., between 38th and 43d Aves., is to be paved soon.

**Santa Barbara, Cal.**—Bids for paving East Boulevard were not opened, and same have been readvertised to be opened Nov. 1, 1915.

**Stockton, Cal.**—City council opened bids Sept. 24 for four street improvement jobs. The first batch of bids opened was pursuant to resolution No. 530, for improvement of west half of East St., from north line of Park St. to north line of Poplar St., to be graded, curbed and guttered with concrete curb and gutter, and roadway paved with asphalt concrete. The city engineer's estimate for the work is \$2,780.65. Bids were as follows: Ransome-Crummey Co., \$2,519.42; A. B. Munson & Son, \$2,564.77; Clark & Henery, \$2,229; Federal Construction Co., \$2,372.71. Bids on work called for in resolution No. 531—the improvement of east half of East St., from north line of Park St. to the north line of Poplar St., with combined concrete curb and gutter and paving of the roadway with "Topeka" wearing surface on an asphalt base. The engineer's estimate for this job is \$2,731.95. Bids were as follows: Ransome-Crummey Co., \$2,455.19; A. B. Munson & Son, \$2,526.65; Clark & Henery, \$2,281.20; Federal Construction Co., \$2,368.84. Improvement of Della St., from the south line of Fair Oaks Ave. to south line of Jensen's addition, and Lafayette St., from the east line of East St. to the west line of Locust St., by curbing, guttering with combined concrete curb and gutter and paving of the roadway with macadam, was third job considered. The engineer's estimate was \$16,037.60. Bidders were the Ransome-Crummey Co., \$15,574.32; A. B. Munson & Son, \$15,066.14; R. C. Tumelty, \$14,302.17; Wrightson, Anderson & Yost, \$17,288.24. Work under resolution No. 533 for the improvement of portions of Scott Ave., Van Buren St. and Monroe St. with concrete curb and gutters and paving of the roadways with macadam bound with liquid asphaltum, applied hot. The estimate for this work is \$13,984.42. The bidders were R. C. Tumelty, \$12,789.66; Ransome-Crummey Co., \$15,716.06; A. B. Munson & Son, \$13,100.25; Wrightson-Anderson & Yost, \$15,274.23.

**Woodland, Cal.**—Woodland trustees have adopted plans and specifications for pavement on East St., from Main to Beamer, and have passed a resolution of intention to pave.

**Fairfield, Conn.**—Members of Fairfield Beach Improvement Association are circulating petition among taxpaying voters of this town calling for appropriation of \$5,000 to be used for purpose of widening and building permit road along beach.

**Wilmington, Del.**—It has been decided to spend \$7,000 in Philadelphia turnpike.

**Miami, Fla.**—Permanent pavement will be laid on following streets: Ave. C, between 10th and Waddell Sts.; Ave. D, between the railroad and Waddell St., and between the river and 20th St.; the Boulevard, between railroad and Fifth St., and between 12th and 14th Sts.; Ave. B, between the railroad and Waddell St.; Palm drive, between 12th St. and 14th St.

**Palatka, Fla.**—Election has resulted in favor of issuing road bonds in sum of \$208,000.

**Alton, Ill.**—Bids will be received Oct. 4 by city engineer T. H. Landon for paving work on Summit Hill and West Fourth Sts.

**Chicago Heights, Ill.**—Board of local improvements will get to work immediately on plans for paving of 22d St. from Wentworth Ave. to East End Ave., and latter thoroughfare from 22d St. to 16th St., and also paving of Wentworth Ave. from 16th to 22d St., completing the loop.

**Edwardsville, Ill.**—Bids for curb and coping were read in open meeting as follows: Brucker Granitoid Co., walls, coping, platforms and posts made of cement, sand and crushed lime stone, \$1,547; George R. Hyten (all concrete), \$2,952; The Concrete Bar Co. (Amicolola marble as specified), \$10,847, if Vermont granite is used add \$3,772; proposition No. 2, Vermont granite posts and approaches as specified, \$6,203; English Bros., coping and approaches, as per plans and specifications, \$17,736, if foundation for stone curb coping and approaches is made 6 ins. less than marked on plans, deduct \$143. If concrete is submitted in place of stone curb, etc., deduct \$6,942; Albert Fahrig, coping, approaches, etc., as per plans and specifications, \$9,800. Bid of Brucker Granitoid Co. will be considered, this being considered lowest bid. All certified checks of other bidders were returned to bidders.

**Peoria, Ill.**—About 22½ miles in Buckheart Township will be dragged at cost of about \$5 a mile.

**Peoria, Ill.**—By action of board of supervisors, Peoria County, on April 2, will vote on question of bond issue of \$500,000 for good roads.

**Quincy, Ill.**—Joint committee from city council and board of supervisors in charge of improvement of Twenty-fourth St. from Jefferson to Harrison has decided to ask for bids in few days.

**Streator, Ill.**—Board of supervisors of Bureau county has given its sanction to continuance of building of state aid roads when they voted to accept allotment from state fund of \$19,700 which will fall to Bureau county. Thus county will be called upon to raise equal amount and there will be expended on Bureau county roads during coming year a sum of \$39,400. This does not mean that there will be that amount put in concrete roads, but rather that Bureau county pledges of itself to expend money on some form of road under provisions of state law. What kind of roads will be built, and where they will be, will be determined at special meeting which will be called for middle of November.

**Fort Wayne, Ind.**—The Hamilton National Bank has purchased \$13,000 worth of Corbin road bonds.



**Princeton, Ind.**—City Council has passed over Mayor Head's veto resolutions ordering property owners to build more than four miles of new concrete walks. The Mayor opposed the order at this time because many of the affected property owners are also facing large curb and gutter and sewer assessments.

**South Bend, Ind.**—Resolution for the widening of alley between Colfax Ave. and Lincoln Way West, as continuation of North William St., has been adopted by board of public works.

**Cimarron, Kan.**—Oiling of streets is recommended.

**Erie, Kan.**—Paving of Main St. is ordered.

**Lawrence, Kan.**—Paving bonds to the value of \$5,000 will be issued by city within next 60 days, and bonds will be marketed at home unless state school fund decides to take the issue. Bonds will cover cost of paving work done this summer.

**Newton, Kan.**—Resolution declaring it advisable to pave certain portions of streets has been adopted. The resolution covers East Sixth St. from the Santa Fe right of way to Kansas Ave., Pine St. between Eighth and Ninth and Ash St. between Broadway and Seventh.

**Barbourville, Ky.**—It is stated that Barbourville-Corbin route of Dixie Highway extension will be in shape to call for construction bids within next ten days. This route, about 15 miles in extent, has been one of main causes of contention in mix-up over Knox County's road building. A section of Cumberland River route toward Whitley County was let several days ago to local contractors, but this has not yet been approved by State authorities.

**Georgetown, Ky.**—Vote may be taken by county upon question of issuing bonds in sum of \$100,000 for reconstruction of Scott County roads.

**Jeffersonville, Ky.**—Bids have been opened by John R. Scott, County Treasurer of Jeffersonville, for sale of \$19,600 worth of bonds ordered issued by Board of County Commissioners for improvement of Froman M. Coots road, formerly Hamburg pike. Six firms bid on the bonds and bid of Fletcher American National Bank was accepted.

**Louisville, Ky.**—Ordinances have been passed for improvement of various alleys.

**Madisonville, Ky.**—Fiscal Court of Hopkins County has let contract for four miles of road under State aid plan. These roads enter Madisonville and are known as intercounty seat roads. A. A. Smith, of Greenville, was lowest bidder by \$700. Other bidders were Earl Stone, of Madisonville, and the Butler Construction Co. The Hopkinsville, Greenville, Princeton and Calhoun roads are called for in contract and work will begin at once.

**Newport, Ky.**—Newport City Commissioners have opened bids for improvement of number of streets with either asphalt or brick paving. The following are the bidders and amounts bid: Asphalt paving—Kirchner Construction Co., 7th St., from Washington Ave. to Overton St., \$3,063.20; Kirchner Construction Co., 5th St., from Washington Ave. to Park Ave., \$6,592.65. Brick paving—German St., 8th to 9th, F. G. Ader Co., \$1,885.20; R. L. Schoolfield and Wm. Jones, \$1,928.75; E. J. Knepple, \$1,806.50; Joseph Dauzenberg, \$1,730.85; 10th St., Isabella to York Sts., E. J. Knepple, \$9,930.85; Schoolfield & Jones, \$9,478.40; Joseph Dauzenberg, \$10,507.99; F. G. Ader, \$11,159.55. 9th St., Monmouth to Washington Ave., Joseph Dauzenberg, \$6,885.25; F. G. Ader, \$7,303.25; E. J. Knepple, \$6,328.24; 7th St., Saratoga St. to Washington Ave., Schoolfield & Jones, \$1,924.25; Dauzenberg, \$2,142.74; Knepple, \$1,993.25; F. G. Ader, \$2,219.42; 7th St., from Monmouth to Saratoga Sts., F. G. Ader, \$2,654.15; Dauzenberg, \$2,562.35; Knepple, \$2,383.75; Schoolfield & Jones, \$2,301.25; 6th St., from Columbia St. to Central Ave., F. G. Ader, \$2,753.20; Dauzenberg, \$2,582.60; Knepple, \$2,468.40; Schoolfield & Jones, \$2,619.20.

**Somerset, Ky.**—Petitions signed by over 2,000 voters asking for special election to vote upon issue of \$300,000 in bonds for good roads in Pulaski County have just been gone over by County Court. That body has fixed Saturday, Dec. 18, as date for special election. Despite fact that Pulaski County has on two previous occasions voted against road bond issues, it seems universally understood over county that there will be practically no opposition to issue now, and county will not only bond itself for \$300,000 to secure better highways, but will also receive

like amount from State in event issue is favorably voted upon.

**Stanford, Ky.**—By only small majority of fifty-two votes proposition to issue \$130,000 in bonds to build new pikes and improve old roads in Lincoln County was defeated at very recent election.

**Williamstown, Ky.**—A vote will be taken by town of Crittenden, this county, September 30 on question as to whether bonds shall be issued for road improvement. Amount of bonds are to be \$1,000.

**Donaldsonville, La.**—Election will be held Oct. 19 to vote on question of issuing 20-year road district No. 1 bonds of Ascension Parish in sum of \$50,000.

**Monroe, La.**—Petition has been received asking for paving of Hudson Ave. from Walnut St. to Fifth St., with gravel and tarvia.

**Baltimore, Md.**—Board of Estimate has approved ordinance providing for paving of Linden Ave. north from North Ave., an improvement that has been sought for more than a year.

**Cambridge, Mass.**—City Council has passed order authorizing issuance of Huron Ave. paving bonds in sum of \$60,000.

**Ann Arbor, Mich.**—Bids for McKinley and Edwin Sts. storm water culvert have been rejected and will be received again Oct. 4, 1915, at 7 p. m. Manley Osgood is City Engineer.

**Detroit, Mich.**—Representative automobile manufacturers of Detroit, in conjunction with Detroit board of commerce, have formed committee to work for building of 300-mile road from Toledo along eastern shore of Lower Michigan peninsula to Mackinaw, where it would connect with West Michigan pike, forming shore route of great scenic beauty around Lower Michigan, with Toledo and Chicago as the eastern and western terminals. Entire route would be about 750 miles long, and at Chicago would connect with the Dixie Highway to New Orleans. After committee has laid out preliminary route matter of road building will be taken up with townships and counties along the route.

**Detroit, Mich.**—Construction of 300 miles of good roads, making continuous highway from Toledo to Mackinaw and connecting all important cities along eastern coast to lower peninsula of Michigan, is planned by committee of Detroiters, representing big automobile companies and Detroit Board of Commerce. Highway will be known as East Michigan Pike, and will connect at Mackinaw with northern terminus of West Michigan Pike, which links Mackinaw with Chicago. Two highways combined will represent total of more than 750 miles, forming shore route of wondrous beauty around three sides of lower peninsula. At Chicago, highway will connect with Dixie highway, to New Orleans. The undertaking is most important good roads project ever attempted in Michigan.

**Hart, Mich.**—Special election has resulted in favor of issuing Pike bonds in sum of \$20,000.

**Kalamazoo, Mich.**—The good roads commissioners met at the court house Sept. 27 for purpose of determining what highways should be built in Kalamazoo County next year so that such report could be submitted to Board of Supervisors at regular meeting in October. Much of the work will be done in finishing up roads already under construction. It is thought that between 12 and 15 miles will be built. The commission will hold several more meetings in near future.

**Owosso, Mich.**—Bonding of county for about \$200,000 for building of good roads is being discussed.

**Reeman, Mich.**—Election has resulted by vote of 205 to 73 in favor of issuing road improvement bonds of Sheridan township to amount of \$35,000.

**St. Joseph, Mo.**—Ordinance has been passed for sidewalks on Edmond St. from 29th to 31st Sts.

**Billings, Mont.**—Bond issue is favored for building of permanent improved highway in Yellowstone County.

**Hastings, Neb.**—Preliminary order for construction work in 21 paving districts has been given by council. Ordinances providing for work have been prepared and will be considered for enactment at adjourned meeting.

**Kearney, Neb.**—Election has resulted in favor of issuing paving bonds in sum of \$50,000.

**Camden, N. J.**—Sum of \$3,300 has been appropriated for improvements to Haddon Ave. Sq.

**Camden, N. J.**—Sum of \$7,000 was granted Street Commissioner for recon-

struction of all culverts on Beson St., between Broadway and 2d St.

**New Brunswick, N. J.**—Ordinances have been adopted for grading, paving and curbing of various streets.

**Hudson, N. Y.**—At special meeting of Board of Supervisors on Sept. 27 the matter of improving county highway between Claverack and Chatham with State aid was taken up. Road considered is about twelve miles in length, and approximate cost about \$142,000. It is divided in two parcels, the first being from Claverack to Ghent village and second from Ghent village to Chatham. First parcel calls for improvement to highway of 4.27 miles and the second 7.77 miles. Plans and specifications submitted to Board shows that of entire cost State will pay 65 per cent., leaving county 35 per cent to take care of.

**Walden, N. Y.**—Petition is now in circulation requesting village trustees to complete paving with vitrified brick on Walnut St. from Main St. to a point 6 ft. north of Soldiers' Monument, where new brick pavement is to commence.

**Lincolnton, N. C.**—City will expend \$20,000 on street improvements.

**Shelby, N. C.**—Election will be held Oct. 16 to vote on question of issuing No. 3 Township Road bonds in sum of \$30,000.

**Canton, O.**—Property owners of Sugar Creek township have filed with Board of County Commissioners petitions asking for macadamizing of strip of road three and one-half miles long, between Justus and Beach City, and another strip four miles in length between Justus and Willmot. Petitions were filed by township trustees of Sugar Creek township, headed by Frank Booth.

**Columbus, O.**—Bond issue of \$27,500 has been authorized for widening North High St., and \$12,000 for opening of Carpenter St.

**Columbus, O.**—Notice is hereby given that Board of County Commissioners of Franklin County, O., will offer at public sale Franklin County, O., road improvement bonds to amount of \$64,360 on Oct. 14, 1915, at hour of 10 o'clock a. m., at office of Board of County Commissioners, Columbus, O.

**Coshocton, O.**—Coshocton County voters will be asked to vote this fall to decide if additional tax levy of one mill shall be made to raise money for road purposes. County Commissioners have decided to put issue to vote so Coshocton County roads can be improved and repaired.

**Lima, O.**—Paving of that part of North St., between Charles and Cole Sts., not covered by improvement now in progress by county, will be done under petition to city instead of by private contract.

**Lima, O.**—Resolution has been passed ordering construction of sidewalks on Delphos Ave.

**Newark, O.**—Ordinance has been passed for issuance of bonds for resurfacing of Hudson Ave. from Locust St. to Charles St.

**Piqua, O.**—Paving of Union St. has been ordered.

**Urbana, O.**—That State Highway Department will aid county in extending improvement of West Liberty road into that village has been stated by Nicholas Koehler, division engineer of the state highway department.

**Youngstown, O.**—Resolutions have been adopted for improvement of several streets.

**Youngstown, O.**—Legislation to pave Crescent St. from Rayen to Manning Ave. has been authorized.

**Portland, Ore.**—Washington St. from 18th to Washington Park will be paved.

**Kittanning, Pa.**—Steps are being taken for improvement of Kittanning-Ford City road.

**Lebanon, Pa.**—Bids have been opened for paving of 8th St., Lehman to Mifflin, and paving of Park Ave., and contract will probably be awarded to the Franklin Co.

**Lower Merion, Pa.**—Board of commissioners of Lower Merion township has passed ordinance appropriating \$50,000 issue for construction and maintenance of highways.

**Philadelphia, Pa.**—Work valued at approximately \$181,750, for which bids will be received on October 14th, was advertised October 1. The estimated cost of the several characters of work are as indicated. Estimated cost: Grading \$49,900; paving asphalt, \$64,000; repaving, asphalt, \$6,500; repaving, vitrified block, \$20,800; repaving, granite block, \$20,800;

repaving, wood block, \$1,100; resurfacing with asphalt (heater method), \$7,000; surfacing, bituminous, \$19,000; surfacing, waterbound macadam, \$2,600; improvement of Bustleton Ave., north of Cemetery road, \$1,000; furnishing and setting of curb (cost to be paid by the city), \$3,000; total, \$181,750. William H. Connell is Chief of Bureau.

**Pittsburgh, Pa.**—At meeting of Wilkinsburg Borough Council general review was made of regrading, repaving and general repair work necessitated by establishing of grade crossings along Pennsylvania R. R. General satisfaction was expressed with work already done on crossings. Borough Clerk W. N. Baker was authorized to advertise sale of \$125,000 worth of bonds, which were approved at bond election in borough August 3.

**Waynesboro, Pa.**—The property owners on South Franklin St., between Main and 2d Sts., have decided that they desire their highway improved with asphalt-macadam and will ask council to apply it, as has been done on several other streets, property holders paying for asphalt. Work will not be undertaken until next spring.

**Central Falls, R. I.**—Under head of new business, Councilman Hobson presented resolution to appropriate \$1,300 to macadamize Lonsdale Ave. from Barber Ave. to Watson St., and to build sidewalks and curb them with granite for same distance. It has been referred to the finance committee.

**North Providence, R. I.**—Appropriation of \$45,000 has been made for oiling of macadam streets by City Council. After a new oiling machine has been purchased, about \$39,000 will be left. This amount will probably not be enough to cover oiling of all streets as frequently as is desirable, as estimates of cost place it at \$48,000. Because of this situation, certain streets which are not heavily travelled will probably be oiled less frequently than others, in order that appropriation may not be exceeded.

**Corpus Christi, Tex.**—Paving of Water St., from Power to Resaca St. has been ordered.

**Ogden, Utah.**—City Board of Commissioners has accepted four bonds from P. J. Moran Construction Co. of Salt Lake, in aggregate sum of \$16,500, in lieu of deposit of 15 per cent. of contract price of certain street paving as guarantee that repairs on service will be made within guaranteed time. Paving districts involved Nos. 102, 103, 105 and 106 and the bonds for the respective districts, as approved this morning, are \$8,000, \$1,500, \$2,000 and \$5,000. The amount drawn from the guarantee fund is \$16,465.43.

**Portsmouth, Va.**—Norfolk County Clerk Martin and Dr. Sturgis, chairman of Norfolk County Board of Supervisors, have signed the \$250,000 recent road bond issue.

**Buckhannon, W. Va.**—Upshur County will vote Dec. 30 on question of issuing road bonds in sum of \$250,000.

**Grafton, W. Va.**—The city of Grafton and Taylor county will combine in work of macadamizing Main St. from eastern end of paving to Blueville and work is to start at once. City will build road to city limits and county will there start and complete work.

**Jamez, W. Va.**—Election has resulted in favor of issuing Street Improvement bonds in sum of \$15,000.

**Seattle, Wash.**—Following plans have been received from engineer: Warren Ave., concrete walks, estimated cost, \$3,300; Harrison St., paving, estimated cost, \$28,000; West 65th St. et al., resurfacing, etc., estimated cost, \$3,300.

**Seattle, Wash.**—Following bids were received for paving East and West Green Lake Way: R. G. Stevenson, \$103,303.25; P. J. McHugh P. & C. Co., \$103,446.31; Ferch & Gass, \$111,691.50; Washington Paving Co., \$104,524.85; Ind. Asphalt Paving Co., \$107,593.20; Jahn Contracting Co., 109,103.75.

**Milwaukee, Wis.**—The Sheridan Road Improvement Association is planning to build 100-mile boulevard between Milwaukee and Chicago.

**Milwaukee, Wis.**—County will improve Willard Ave. from Cedarburg road near North Milwaukee to North Fond du Lac road. Road on south side known as Comet Ave., between Lake road and the Chicago road also will be improved. Plans were discussed by the county board highway committee, and it is expected improvements will be made early next year.

## CONTRACTS AWARDED.

**Carrollton, Ala.**—To W. A. Hicks, of Fayette, at \$90,402, for grading, shaping and surfacing 10 miles of road.

**Linden, Ala.**—To Harvey & Co., Memphis, Tenn., contract by county to construct road from Hale County line to Dayton, for about \$60,000.

**Selma, Ala.**—It is reported in Selma that Wilcox County has awarded contract to Central Alabama Construction Co. for building road from Gastonburg to Clarke County line, a distance of about 20 miles, work to cost \$70,000. Dallas road is built to Wilcox County line, and it is reported Clarke County will build her road right through county as soon as Wilcox link is completed.

**Phoenix, Ariz.**—City Commission has recommended approval of bid of Talbot & Hubbard for caterpillar tractor at \$1,634, with which City Manager Craig proposes to accomplish much in way of rebuilding unpaved streets of this city. Proposition to advertise for bids for electrically driven street sprinkler and street flusher was also approved.

**Los Angeles, Cal.**—By Board of Public Works, for street improvement work, to the California-Arizona Construction Co. at prices named for said work in its proposal, on file, to wit: 10-9-10 cents per sq. ft. for asphalt concrete paving, Specifications No. 102. 2-7-10 cents per sq. ft. for grading to sub-grade, Specifications No. 102. 15 cents per sq. ft. for concrete gutter, Specifications No. 91. 40 cents per sq. ft. for granite block gutter, Specifications No. 71.

**San Francisco, Cal.**—Board has awarded to Flinn & Treacy contract to improve Lippard Ave., from Bosworth St. southerly for \$3,858.

**Santa Ana, Cal.**—To Hart & Ducey, at \$1,934, for paving  $\frac{1}{2}$  mile of Irvine boulevard.

**Stockton, Cal.**—For paving North Center, Maple and Ash St. awarded to W. H. Paul, Oakland, at \$21,969.

**Connecticut.**—Following contracts have been awarded by State Highway Commissioner, Charles J. Bennett: Town of Colebrook: A section of 5-in. native stone macadam road on the Robertsville highway to F. A. Wilcox, Norwich, Conn., for approximately \$5,759.25. Town of Orange: A section of bituminous macadam road on Main St., Savin Ave. and Congress Ave., to the R. D. Daley Co., New Haven, Conn., for \$28,000. Town of Stamford: A section of native stone macadam road to the R. G. Miller Contracting Co., Hartford, Conn., for \$21,000. City of New Haven and Town of North Haven: A section of bituminous concrete on the Hartford-New Haven turnpike to the Union Paving Co., Schenectady, N. Y., for \$22,000. Town of Newington: A section of bituminous macadam (tar penetration), to Thomas Kearney, Meriden, Conn., for \$6,878.50. Town of Bloomfield: A reinforced concrete T-beam bridge over Wash Brook to Fred D. Miller, Norwich, Conn., for \$1,800. Town of Brookfield: A section of graded road on the Danbury turnpike to Louis Longhi & Bro., Torrington, Conn., for \$11,000. Town of Litchfield: Two sections of 4-in. trap rock macadam road to Louis Longhi & Bro., Torrington, Conn., for approximately \$6,810. Towns of Wallingford and North Haven: A section of bituminous concrete to the Lane Construction Corporation, Meriden, Conn., for approximately \$24,000.

**Idaho.**—By State Highway Comm., Boise, to Reese & Munson, Blackfoot, for contract as follows: to construct 22 miles of state highway between Lava Hot Springs and Lund, at following bid: 82,000 cu. yds. earth excav., 18 cts.; 3,000 cu. yds. wet earth excav., 35 cts.; 4,925 cu. yds. loose rock excav., 50 cts.; 325 cu. yds. solid rock excav., 1.50; 4,530 cu. yds. overhaul per 100 ft., 1.5 cts.; 5 mile machine grading, \$150; 30 acres sage brush to clear, \$6; 1,262 ft. 12-in. iron culvert pipe to lay, 20 cts.; 566 ft. 18-in., 30 cts.; 174 ft. 24-in., 35 cts.; 24 ft. 30-in., 37½ cts.; 113 cu. yds. concrete in culvert end walls, \$14; total, \$21,161. Other bidder: Idaho Constr. Co., Boise, \$23,389. Reese & Munson also was given contract for constructing  $\frac{3}{4}$  miles State highway between Alexander and Grace, at \$5,266.

**Jacksonville, Ill.**—To Interstate Paving Co., of East St. Louis, contract, at \$12,609, for paving South Main St., Morton Ave. to Michigan Ave.

**St. Charles, Ill.**—For street improvements as follows: Wisconsin Improvement Co., Racine, Wis., \$55,391 (prob-

ably awarded contract); Arwen Price, Elgin, \$56,698; Logan & Glertz, Elgin, \$56,988. John W. Wilson is City Engr.

**Anderson, Ind.**—By Commissioners of Madison County for concrete road in Anderson Township to George Hopps, Anderson, at \$6,973.

**Indianapolis, Ind.**—Contract for paving Kenwood Ave. between 36th and 38th Sts. with asphalt has been awarded to Marion County Construction Co. by Board of Public Works. Contract price is \$24,828.84 and board's record shows work is not to be started until next spring.

**Muncie, Ind.**—Three contracts for construction of sidewalks have been awarded by special committee of council to William M. Birch.

**Clinton, Ia.**—For sidewalks, to C. M. Neal, Lyons, Clinton, Ia.

**Clear Lake, Ia.**—To Bryant Asphalt Paving Co., Waterloo, Ia., for 50,000 sq. yds. asphalt paving at about \$65,000. Other bidders were Fielding & Shepley, St. Paul, H. J. Cathroff, Omaha, and J. L. McLaughlin of Red Oak.

**Creston, Ia.**—Contract for construction of about 12,000 sq. ft. of cement sidewalk has been let to E. Kenny & Sons of Creston, Ia., at 12c. per sq. ft. Theo. S. De Lay is City Engr.

**Creston, Ia.**—For 12,500 sq. ft. Portland cement concrete sidewalks to E. Kenney & Son, Creston, Ia., at 12 cts. per sq. ft.

**Guthrie Centre, Ia.**—For 38,535 sq. yds. brick 3-in. wire cut pavement to Moore-Sieg Const. Co., Waterloo, at \$1.89 per sq. yd., or total of \$69,878.23.

**Louisville, Ky.**—Bids were opened Sept. 27 by Board of Public Works for paving with asphalt at expense of property owners following streets: Guthrie, from 3d to 4th Sts.; 29th St., from Gorland to Kentucky Sts., and 34th St., from Broadway to Magazine St. The Louisville Asphalt Co. was lowest bidder for Guthrie St., at \$1.82 a sq. yd., and 29th St., at \$1.79 a sq. yd. The Bickel Asphalt Paving Co. was lowest bidder for 34th St., with bid of \$1.80 a sq. yd. On Guthrie St. binder will be  $\frac{1}{2}$  in. thicker and asphalt  $\frac{1}{2}$  in. thicker than on other streets. Entire expense of Guthrie St. improvement will be borne by Speed Realty Co. Board will pass upon the bids.

**Mayfield, Ky.**—At meeting of Graves Fiscal Court contract to build 11 miles of state highway, known as Mayfield and Paris, Tenn., road, running south from Mayfield, was let to C. E. Cressap & Bro., of Humboldt, Tenn., for \$25,285.13. This includes excavation, grading and graveling. Successful bidder for building 37 concrete culverts and three corrugated pipes was Yancy & Johnson, of Paducah, at \$4,824.36. Work is to begin at once.

**New Albany, Ky.**—Board of County Commissioners has awarded to W. F. Woodruff, of Louisville, contract for reconstruction of New Albany and Paoli pike through Lafayette and Greenville townships. Pike is part of Dixie highway. Contract was awarded under unit plan and it is provided that work is to be performed under supervision of Geo. Wright, county superintendent of highways. The County Council in New Albany recently appropriated \$41,000 for the reconstruction of that part of the pike to conform to Dixie Highway specifications.

**Princeton, Ky.**—The model road work of from one to two miles on Cadis road has been awarded to Durrett Construction Co., of Louisville. Price bid was by cubic yard of road macadam, and by the yard or mile as to preparing roadbed for macadam. Work when complete will cost over \$5,000 per mile. Work is to begin within 15 days next after contract is ratified, and to be completed in from 60 to 90 days.

**Whitesburg, Ky.**—County Judge Henry T. Day and Letcher Fiscal Court have awarded several miles of good road building radiating out from Whitesburg, a goodly part of which is to be built by State aid. J. J. Brady, a contractor of Alabama, received contract for road between this city and Mouth of Colly and will begin its construction at once. Nat. Hale, of Colson, received contract to build stretch of good roads near Kona Station.

**New Orleans, La.**—To Warren Bros. Co., Boston, Mass., low bidders at \$42,900 for construction of an asphalt plant. The Jefferson Construction Co., city, bid \$53,994.

**Duluth, Minn.**—Resolutions awarding contracts for paving of 58th Ave. west



from Elmore to 8th St. to A. Hedenberg and for paving of 3d Ave. east from 7th to 8th Sts. to J. D. O'Donnell have been introduced by Commissioner Farrell.

**Duluth, Minn.**—The Barber Asphalt Co. of Philadelphia, Pa., has been awarded contract for furnishing city with 50 tons of asphalt on their bid of \$21.30 a ton.

**St. Paul, Minn.**—For paving Warsaw St. from Pleasant Ave. to Seventh St. to Fielding & Shepley, St. Paul, at \$17,900.

**Walker, Minn.**—Bids for 100 miles of Elwell highways leading out of Walker were opened by the county auditor Sept. 25 there being approximately fifty bidders. Bid of Brandenburg Construction Co. of Minneapolis is lowest for Walker-Cass Lake highway of 26 miles, while either Moberg Construction Co. of Grand Rapids or Park Rapids Construction Co. will land 76-mile highway from Walker to Pillager. Lowest bidder for culverts for highways were Wheeling Corrugated Co. of Wheeling, W. Va. These are last two Elwell roads to be constructed in State, law having been repealed at last session of Legislature.

**St. Louis, Mo.**—For approximately 60,000 cu. yds. of grading to Gruin-Colnon Contracting Co., Merchant Laclede Bldg., St. Louis, at 16.6c. per cu. yd.

**Grand Island, Neb.**—For 3,686 sq. yds. vertical fibre vitrified brick paving, Dist. 15, to D. D. Kingsbury, Grand Island, at \$1.98 per sq. yd., and for 940 sq. yds. in Paving Dist. 14 to C. A. Pierce, Grand Island, Neb., at \$1.35 per sq. yd.

**Kearney, N. J.**—Town council on Sept. 29 awarded contract for paving Brighton Ave., from Rutland Ave. to Afton St., to Northern Construction Co., whose bid was lowest, \$11,215.75. Other bids were: W. T. S. Critchfield, \$11,455; Uvalde Asphalt Paving Co., \$12,049; Hornell & Blair Co., \$12,860; Glenfield Construction Co., \$14,821.50. A guaranty period of 10 years accompanied the bids. The avenue is to be paved with Bermudez sheet asphalt on a concrete foundation. The amount of paving to be done is 6,250 sq. yds.

**Newark, N. J.**—By Bd. Street and Water Comrs. for grading, curbing, flagging and paving Front St. and Saybrook Place, 4,200 sq. yds. granite oblong pavement to A. J. Milmo of Newark, \$23,621. Contracts were also awarded by Board Freeholders as follows: repaving with Warrenite on Broad St. from Bloomfield Center to Bay Ave., Bloomfield, and Valley Road, Montclair from Bloomfield Ave. to Passaic County line, both to Standard Bitulithic Paving Co., at \$37,517 and \$86,450, respectively; repaving Wyoming Ave., South and West Oranges, with asphalt block, to Bamberger-Chapman Co., at \$46,167.

**South Amboy, N. J.**—For curbing and paving of Bordentown Ave., to the Wilbur Bluestone Co., at \$773.50.

**Dunkirk, N. Y.**—The repairing of asphalt pavements of city which has been so sadly neglected probably will be arranged for soon. Common council awarded to James McNamara contract for paving Taft Pl. and James Ave. with asphalt.

**Lockport, N. Y.**—Contract for new asphalt block pavement on Horvey Ave., between LaGrange Ave. and High St., was awarded by Common Council Sept. 27 to C. N. Stainthorpe & Co., on their bid of \$4,980. Only other proposal was from C. E. Whitmore Co., in sum of \$5,260.

**Long Island City, L. I., N. Y.**—Contracts have been let for 3 highway jobs as follows: Regulating, grading, curbing and laying sidewalks and paving with a permanent pavement, consisting of sheet asphalt, upon a concrete foundation, 6 ins. thick, in Fairview Ave., from Linden St. to Gates Ave., Second Ward, the Sicilian Asphalt Paving Co., \$1,622.50. Regulating and grading the sidewalk spaces and laying sidewalks in Parsons Ave., from Queens Ave. to Sanford Ave. and in Gerold (19th St.), from California (Cypress) Ave. to a line about 260 ft. north of Franconia Ave., Third Ward, Thomas F. Touhy & Co., Inc., \$2,057.50. Regulating and repaving with improved granite blocks on a concrete foundation, 6 ins. thick, in the Boulevard from Park Ave. to Remsen Ave., Fifth Ward, H. J. Mullen Contracting Co., Inc., \$57,460.

**New York, N. Y.**—By President Boro. Manhattan as follows for sheet asphalt pavement: To Sicilian Asphalt Paving Co., 41 Park Row, 44th St. from Madison Ave. to 324 ft. east; 66th St. from Park Ave. to Fifth Ave., and 88th St. from West End Ave. to Broadway, at a total of

\$10,848.55; Astec Asphalt Co., 90 West St.; 62d St. from Second to Fifth Ave., \$18,121; Asphalt Constr. Co., 208 Broadway, Haven Ave. from 170th to 172d St., \$4,673; Cleveland Trinidad Paving Co., Flushing, Second Ave. from Third to Fourth St. (granite) at \$2,383.

**Rochester, N. Y.**—W. E. Kinney & Co. will lay new sidewalks in Genesee Park Blvd., contract having been awarded for \$944. Brick was designated as pavement to be used in Eiffel Pl. and asphalt for Rowley St.

**Rochester, N. Y.**—At special meeting of Board of Contract and Supply Sept. 30 contracts for street improvements were awarded, largest being that for brick pavement in Reynolds St., awarded to Oliver Costich for \$3,481.50. Other awards follow: Margaret St. sewer, walks and grading, A. Petrossi, \$2,433.15; Pioneer St. walks, grading and sewer, James Passero, \$1,000.60; Glasgow St. walks, A. Petrossi, \$423.50; Lincoln Ave. sewer, walks and grading, \$1,767.62; Hetzel Alley asphalt pavement, Julius Friedrich, \$1,665.75.

**Hamilton, O.**—Ford J. Davis has been awarded contract for construction of concrete culvert at Mary C. Roubush farm in Oxford Township, at his bid of \$565.

**Salem, O.**—By Township for brick pavement in Leetonia-Lisbon road to M. P. Connelly & Son, Youngstown, O. Contract awarded Sept. 28, and on Franklin Square road to Frank George, Pittsburgh, Pa.

**Toledo, O.**—For improving Stone Road Improvement No. 72 to M. P. Hammin, Valentine Bldg., Toledo.

**McAlester, Okla.**—City of Poteau has let contract for several blocks of concrete paving on Sept. 22 to J. W. Rooks of McAlester for a price of \$15,768. Work will commence at once and will be pushed to completion as soon as possible.

**Poteau, Okla.**—To J. W. Rooks, of McAlester, contract at \$15,768, to construct several blocks of concrete paving.

**Tillamook, Ore.**—For concrete paving to F. C. Feldschan, Tillamook, Ore., at \$1.34 per sq. yd., or total of \$7,088.73.

**Gaffney, S. C.**—For construction of 3,750 sq. yds. brick pavement to Southern Paving & Const. Co., Chattanooga, Tenn., at \$1.64 per sq. yd.

**Houston, Tex.**—For repairs to Lake Shore Drive to W. A. Scott, Houston, at \$2,950.

**Bland, Va.**—For grading and draining 2.46 miles dirt road to J. C. Tuggle, Rocky Gap, Va., at \$6,990. This road is to connect with new road from Bluefield, W. Va., to top of East River Mt. at State line, now being built by Mercer Co., W. Va. Is to be completed by May 1, 1916.

**Fulton, W. Va.**—For paving of Center St., to Frank Brandfass.

**Seattle, Wash.**—For paving Mill St. to E. Amaldo & Co., at \$11,260.85, and for grading 10th Ave. N. E., to McGuire Bros., at \$9,789.80.

**Sheboygan, Wis.**—John Braun was lowest bidder on work of paving Ontario Ave. from Fifth St. to Third St. and will be awarded contract. Following bids were opened in office of Board of Public Works Sept. 27: Grading and paving of Ontario Ave., from Fifth St. to Third St., John Braun, \$4,767; Murphy Construction Co., \$4,905.90 Grading and paving of Ninth St. from Jefferson Ave. to Pennsylvania Ave., Murphy Construction Co., \$3,137.46; John Braun, \$3,226. Grading and paving Indiana Ave. from South 17th St. to 18th St., Murphy Construction Co., \$2,990.40. Sewage well at intersection of 13th St. and Bell Ave., Charles Honold, \$1,575 and \$10 per ward for additional concrete; Birdsall Construction Co., \$1,820; Plus Heilberger, \$2,750.

**Toronto, Ont.**—To Construction & Paving Co. for paving with asphalt on Bloor St., from Dundas St. to Indian road, at \$13,416, and from Pacific to Hill Park Ave., at \$7,450, and to J. H. McKnight Constr. Co., for brick pavement on Bloor St., from Indian road to Pacific Ave., at \$19,004.

## SEWERAGE

**Sacramento, Cal.**—City commission will be asked by Commissioner Simmons to pass as emergency health measure proposition of installing sewer along Hollyhock Ave. According to Simmons, it will take about 800 ft. of sewer effectively to drain the district. The cost will be about \$1 per foot.

**Willows, Cal.**—Engineer John P. Ryan has been retained by Willows trustees to make survey of proposed outside sewer district, taking in territory not now in first sewer district. Citizens have petitioned for formation of such a district. Work will cost between \$20,000 and \$25,000.

**Boulder, Colo.**—City Council has approved plans of City Engineer Geo. Joslyn for construction of storm sewers, and of Water Commissioner Tom Barry for service connections and water mains in newly created paving district in business section of city, and ordered work done by contract. These improvements, which will cost \$26,973.75, according to estimates prepared by Joslyn and Barry, will be undertaken just as soon as finance committee, to whom matter of financing work was referred, devises ways and means of raising necessary funds.

**Boulder, Colo.**—Ordinance has been adopted ordering construction of sewer starting at South End of 8-inch sanitary sewer in alley between 15th and 16th Sts., same being point 50 ft. south of manhole in Block 16, University Place Addition; the said manhole being 345 ft. south of south line of Euclid Ave.; thence south along the center line of said alley for distance of 116 ft.

**Indianapolis, Ind.**—Board of public works is planning to construct sewer in East Michigan St. at estimated cost of \$31,000 and one in Germania Ave. at cost of \$16,000.

**Muncie, Ind.**—Two estimates of City Engineer Deardorff were approved by special committee of council. The estimate for construction of a sewer in Main St. from Lincoln St. to Macedonia Ave. was in the sum of \$250 and the one for construction of sewer in Seymour St. from Vine St. to Hackley St. was in sum of \$650.

**Muncie, Ind.**—Macadam roadway will be laid on 12th St., from Hoyt Ave. to Burlington Pike.

**Cedar Rapids, Ia.**—Sewer bids were not opened, and new bids will be asked for.

**Clinton, Ia.**—Following bids were submitted for Sewer District No. 3: D. E. Keeler, Davenport, segmental block, \$66,209.80; reinforced concrete, \$75,233.15; vitrified sewer pipe, \$32,838.67. A. C. Comstock, Cedar Rapids, segmental block, \$73,614.00; vitrified sewer pipe, \$36,509.60. Ind. Construction Co., Davenport, Iowa, segmental block, \$63,797.95; vitrified sewer pipe, \$31,253.56. Illinois Imp. and Ballast Co., Chicago, segmental block, \$64,954; reinforced concrete, \$70,493.27; vitrified sewer pipe, \$33,610.50; concrete sewer pipe, \$38,397.50. O'Neal & Preston, St. Paul, segmental block, \$66,118.60; vitrified sewer pipe, \$34,627.02. Jas. Kennedy, Fargo, N. Dak., segmental block, \$63,734; vitrified sewer pipe, \$31,134. Dearborn Construction Co., Waterloo, segmental block, \$66,564.16; vitrified sewer pipe, \$32,391.35. Thos. Carey & Sons, Clinton, segmental block, \$60,016.90; reinforced concrete, \$67,370.20; vitrified sewer pipe, \$30,008.63; concrete sewer pipe, \$34,431.25; also following bids for Sewer District No. 2: D. E. Keeler, Davenport, total vitrified sewer pipe, \$39,321.30. A. C. Comstock, Cedar Rapids, total vitrified sewer pipe, \$45,536.75. Independent Construction Co., Davenport, total vitrified sewer pipe, \$36,712.40. Improvement & Ballast Co., Chicago, Ill., total vitrified sewer pipe, \$39,287.75; total concrete sewer pipe, \$43,144.25. O'Neal & Preston, St. Paul, total vitrified sewer pipe, \$40,070.10. Jas. Kennedy, Fargo, N. D., total vitrified sewer pipe, \$37,774.95. Dearborn Construction Co., Waterloo, Ia., total vitrified sewer pipe, \$37,247.05. Thos. Carey & Sons, Clinton, total vitrified sewer pipe, \$34,831.85; total concrete sewer pipe, \$42,671.95.

**Morningside, Ia.**—Bids will shortly be asked for sewer system for North Morningside. Estimated cost, \$12,000.

**Oskaloosa, Ia.**—People residing on C avenue west, in block east of the G St. intersection, desire convenience of sewer accommodations and have asked that extension of 270 ft. of 8-in. sewer be constructed.

**Lawrence, Kan.**—Bids will be readvertised for construction of sewer in 1400 block, between Pennsylvania and Delaware Sts.

**Lexington, Ky.**—Ordinance has been passed ordering construction of sanitary sewers on Columbia Ave. and Woodland Ave.

**Lexington, Ky.**—Construction of sanitary sewer on North Limestone St. from Main to Third, has been authorized.

**Haverhill, Mass.**—It has been decided by city council that sewers in Fifteenth Ave. and Spruce St. shall be built this year and bond order for \$2,500 to pay expenses will be presented at meeting of council.

**Kalamazoo, Mich.**—Petition for drain into Kalamazoo River has been filed with Albert Little, County Drain Commissioner, by Nathan Pool. Petition will be acted upon within a week or ten days.

**Duluth, Minn.**—Sanitary sewers have been ordered in 51st alley, between Ramsey and Polk Sts., \$3,171.03; in 11th St., between 7th and 8th Aves. east, \$574.59; in Water St., between 23d and 24th Aves. east; in 7th St., between 17th and 18th Aves. east, \$450.34, and in Magellan St., between 41st and 43d Aves. west.

**Paterson, N. J.**—Ordinance has been adopted for construction of sewers in certain city streets.

**Trenton, N. J.**—Ordinance has been passed authorizing construction of Sewer No. 640 in alley between Broad and Adeline Sts.

**Batavia, N. Y.**—Chester & Fleming, Pittsburgh, Pa., have been retained by city to prepare plans for rebuilding sewage-disposal plant.

**Peekskill, N. Y.**—Bids will be received Oct. 8 for extension of Hudson Ave. sewer.

**Schenectady, N. Y.**—Two sewage pumps were asked for by Department of Public Works, one for sewage disposal plant and second for sewage pumping station in North Ferry St.

**Skaneateles, N. Y.**—At meeting of village trustees held recently it was voted to receive sealed proposals for five bonds of village of Skaneateles to be called the "Elizabeth Street Sewer Bonds." The bids will be received October 5, at trustees' rooms in the engine house. The bonds are to be issued for \$1,000 each, and will be dated November 1, 1915. The bonds will be sold to highest bidder, but bids cannot be less than par. It was voted to issue bonds at a special village election. Sewer which is to cost \$10,000, is under construction.

**Syracuse, N. Y.**—Alderman Wilson's ordinances have been adopted authorizing city engineer to prepare sewer maps for addition to 17th ward as amendment to Grey system and to prepare maps for 17th Ward sewer system, showing proposed sewers and right of way to be acquired.

**Columbus, O.**—Bond issue of \$75,000 has been authorized for Frambes Ave. storm sewer.

**Marian, O.**—Petition for sanitary sewer and storm water sewer on Henry St., from Ballefontaine Ave. north to Darius St. and then west to the Uncapher Ave. sewer, has been referred to sewer committee.

**Mansfield, O.**—Resolution has been adopted declaring it necessary to improve Strawberry Alley from west line of Diamond St. to point 300 ft. west, by constructing 8-in. sanitary sewer, together with 6-in. branch lines across lots 205, 206, 239 and 240, together with the necessary manholes and flush tanks.

**Mansfield, O.**—Ordinance has been passed for improvement of Sewer District No. 1 by construction of 10 and 12-in. main sanitary sewer.

**Massillon, O.**—Sewers committee has submitted report advising council to ask for plans and estimates for construction of sanitary sewer through Columbia Heights and territory in vicinity. Resolution 1188 to construct sanitary sewer in Green St. was given its third reading and passed.

**Mount Vernon, O.**—Resolution has been adopted for construction of sewer in Pennsylvania Ave.

**Niles, O.**—Sewer bonds in sum of \$9,800 have been sold to Stacey & Braun, of Toledo.

**Piqua, O.**—Construction of storm sewer in District No. 2 is ordered.

**Springfield, O.**—Ordinances have been passed under suspended rules determining to proceed with sanitary sewers in first alley west of York St., Mill Run to Railroad St.; Sheridan Ave., Harrison St. to point 50 ft. east of Willard; Liberty St., Limestone to point 120 ft. east of Fountain Ave.

**Springfield, O.**—Sealed proposals will be received at the office of the auditor of city of Springfield, Ohio, until 12 o'clock noon of Monday, November 1st, 1915, for purchase of bonds of said city aggregating sum of \$6,271 issued for purpose of constructing storm water sewer in Lowry

Ave. from State St. to Clark St., and connecting sewer in Oakwood Pl. from Lowry Ave. to Plum St. Frank B. Thomas is City Auditor.

**Tiffin, O.**—State board of health has recommended installation of sewage disposal plant.

**Williamsport, Pa.**—Ordinance has been passed providing for storm sewer in 6th Ave. from Park Ave. to Isabella St. and in Isabella St. to 7th Ave. Appropriation for the work was placed at \$1,790.

**Waco, Tex.**—Members of Rotary Club have voted to have committee consult competent engineers and citizens of city who have had experience in regard to whether \$75,000 contemplated for sewage disposal plant in bond election that has been ordered for October 19 is sufficient for that purpose.

**Parkersburg, W. Va.**—With the object in view of improving sewer conditions in several parts of city, resolution was introduced in council at meeting which, if adopted after it has been on file for a week, will provide for number of new sewers in sections of city where it is considered by city officials that they are most needed at present time. Plans and specifications for new work have been placed on file also.

**La Crosse, Wis.**—Extensions will shortly be made to sewer system at cost of \$200,000. George Bradish, city engineer, is preparing plans.

#### CONTRACTS AWARDED.

**Los Angeles, Cal.**—By Board of Public Works for construction of public sewer in Myra Ave. to Adam Dalmatin at \$27,945.

**Pasadena, Cal.**—For constructing concrete storm water conduits for drainage purposes to J. E. Haddock at \$25,900.

**Miami, Fla.**—Large sewer contract has been let to J. J. Quinn Co., the laying of trunk sewer on Biscayne Drive. The work will probably be commenced within few weeks and will cost \$25,000. This sewer will commence at cemetery and end at north limits of city.

**Ocala, Fla.**—By city, to Bryan & Co., Jacksonville, at \$66,740.35, to construct sanitary sewer system: 5,788 ft. 6-in., 101,315 ft. 8-in., 8,145 ft. 10-in., 2,215 ft. 12-in., 3,480 ft. 15-in. and 260 ft. 18-in. sewer pipe, 237 manholes, sewage disposal system, 51 automatic flush tanks, etc.; J. B. McCrary Co. are engineers, 1408-1417 3d National Bank Bldg., Atlanta, Ga.

**Indianapolis, Ind.**—To Columbia Construction Co., city, contract by Board of Public Works for constructing Warman Ave. and Raymond St. sewer interceptor for \$22,827.

**Princeton, Ind.**—Contract for sanitary sewer system for south part of city has been awarded by city council to John L. Newman, of Evansville, for \$6,126. There were nine other bids.

**Ames, Ia.**—Following contracts were awarded as follows for constructing sewers. Sanitary sewer and subdrain, to Dearborn Constr. Co., Waterloo, \$24,789; other bids, Cole Bros., Ames, \$25,962; Moore, Seig Co., Waterloo, \$26,134; Public Service Constr. Co., Omaha, \$28,124. Sanitary sewer, Ward Four, to Dearborn Constr. Co., \$13,961; other bids, Cole Bros., \$14,501; Moore, Seig Co., \$14,563; George M. King, Des Moines, \$14,647. Storm sewers, to Dearborn Constr. Co., \$28,937; other bids, Cole Bros., \$32,570; Moore Seig Co., \$31,855; Public Service Constr. Co., \$35,302. A. B. Maxwell is city clerk.

**Keokuk, Ia.**—For construction of 8-in. sanitary sewer through Block 15, Kilbourne's Addition, to Keokuk Quarry & Construction Co.

**Waterloo, Ia.**—To John Nelson Construction Co. for 733 lin. ft. of sewers at \$1.22 per lin. ft. for 15-in. pipe, \$1.12 for 12-in., \$37 for manholes and \$6.50 for lamp holes. Other bidders were the Dearborn Construction Co., and the Moore-Leig Construction Co.

**Ann Arbor, Mich.**—By board of public works for construction of sewer in Dist. No. 68, 7th, Bath and Willow Sts., to Wm. Eddy & Son, Saginaw, Mich., at \$3,248.89; for Dist. No. 69, Mosley St. 2d to 3d Sts., to Thomas Joyce, Kokomo, Ind., at \$205; also Dist. 70, at \$390.60; Dist. 71, at \$217.60, and Dist. 72, at \$10,005.50; for Glen Ave. storm sewer, to Wm. Eddy & Son, at \$8,955.50.

**Kalamazoo, Mich.**—Contracts for construction of Travis dam in Cooper Township have been let by Commissioner Albert Little. Leo Flack, of Mendon, and Carl Breese, of Cooper, will do the excavating and Albert Ouderkerk will con-

struct culverts. Drain will cost about \$1,100.

**Lyle, Minn.**—For construction of 12-, 246 ft. 8-in., 10-in., 12-in., 15-in. sewer to Wm. Danforth, Hackney Bldg., St. Paul, Minn., at \$14,500.

**St. Paul, Minn.**—Siema-Cary Co. was lowest bidder at \$95,000, \$100,000 and \$102,000, according to material specified, for construction of Frederick-Fairmount sewer system.

**Wayne, Neb.**—To Geo. L. Vlasnik, Lincoln, Neb., for Sanitary Sewer No. 4, 4,600 ft. 8-in. pipe at 64¢ c.; average depth of 1½ ft., 13 manholes at \$43 each.

**Bogota, N. J.**—To Averill & Mathews, Newark, at \$6,349, for sewer extension in River Road.

**Albany, N. Y.**—Following is itemized bid of Foundation Co., Woolworth Bldg., New York, the successful bidder for sewage pumping stations: 6,000 cu. yds. excav. above elev. 3, 60 cts.; 9,000 cu. yds. excav. below elev. 3, \$3.50; 16,000 cu. yds. general embankment and filling, 50 cts.; 1,900 cu. yds. loam, 50 cts.; 1½ acres seeding, \$30; 250 sq. yds. sodding, 30 cts.; 100 cu. yds. gravel in roadways and walks, \$2; 500 sq. yds. concrete pavement, \$1; 230 cu. yds. concrete, Class A, \$15; 1,600 cu. yds. concrete, Class B, \$14; 970 cu. yds. concrete, Class C, \$12.50; 1,100 cu. yds. concrete, Class D, \$10; 300 cu. yds. concrete, Class E, \$12; 270 cu. yds. concrete, Class F, \$9; 20 lin. ft. 2-duct vitr. conduit, 25 cts.; 250 lin. ft. 4-duct vitr. conduit, 40 cts.; 90 lin. ft. 6-duct vitr. conduit, 55 cts.; 80 lin. ft. 9-duct vitr. conduit, 80 cts.; 40 tons c-i pipe, \$35; 28 tons bell and spigot special castings, \$65; 2 tons flange special castings, \$90; 1 4-in. gate valve, \$15; 5 6-in. gate valves, each, \$16; 1 6-in. gate valve (single seat), \$30; 2 8-in. gate valves (single seat), each, \$30; 8 valve boxes, each, \$6; 3 fire hydrants, each, \$50; 2 6-in. sluice gates, each, \$25; 1 54-in. sluice gate (elec. oper.), \$800; 5 6-in. flap valves, each, \$20; diversion gate (lump sum), \$175; 250 lin. ft. railroad track, steel ties, straight, 60 cts.; 35 lin. ft. railroad track, steel ties, curved, 75 cts.; 1,200 lin. ft. railroad track, wooden ties, straight, 65 cts.; 200 lin. ft. railroad track, wooden ties, curved, 90 cts.; 2 switches, steel ties, each, \$35; 10 switches, wooden ties, each, \$30; storage battery locomotive (lump sum), \$2,850; crane runway (lump sum), \$100; Power rails for crane (lump sum), \$190; locomotive crane (lump sum), \$5,000; screenings bucket (lump sum), \$100; 60-in. venturi meter (lump sum), \$3,500; reconstruction sewage force main (lump sum), \$600; indicating apparatus (lump sum), \$700; 20,000 lbs. iron castings, 0.055 ct.; 37,000 lbs. miscellaneous steel work, 7 cts.; 260,000 lbs. steel reinforcement bars, 0.025 ct.; 5,000 lbs. wrought steel floor plates, 10 cts.; 200 sq. yds. surfacing floors, granolithic finish, \$1; 280 sq. yds. surfacing floors, concrete hardened, \$1; 500 lin. ft. pipe railing, plain knobs, \$2.50; 40 lin. ft. pipe railing, brass knobs, \$3; 2 stop plank gates for grit chamber, each, \$50; superstructure, Westerly Station (lump sum), \$18,439; superstructure, Gate House (lump sum), \$1,481; superstructure, Tool House (lump sum), \$2,157; patrooms pumping station (lump sum), \$13,100; work appurtenant to Patrooms Station (lump sum), \$1,400; 200 working days for completion, per day, \$20; total, \$172,772.25.

**Long Island City, L. I., N. Y.**—Bids were opened Oct. 1 in Borough Hall for eight sewer jobs, lowest figures totaling \$111,293, \$172,432 in all, and for three highway contracts, lowest figures aggregating \$61,139. These are biggest lot of contracts that have passed through Queens office in some time. Contracts and lowest bidders were as follows: Sewer and appurtenances in Hunters Point Ave., Borden Ave., Laurel Hill Ave., Towns Pl., Locust St., Anabel Ave., Packard St., Greenpoint Ave., Queens Boulevard, N. S., and in Nelson (Nott) Ave., to Joseph L. Sigretto & Co., \$57,710.64. Sewer and appurtenances in Kimball Ave., Lawn Ave., McCormick Ave., Oxford Ave., Seattle St., Portland Ave., Herald Ave., to Joseph L. Sigretto & Co., \$22,587.05. Sewer and appurtenances in Herald Ave., from Forest Park to Brandon Ave.; Guilin Ave., from Myrtle Ave. to the crown, 625 ft. south of Brandon Ave.; Bedford Ave., from Myrtle Ave. to Jamaica Ave.; Greenwood Ave., from Myrtle Ave. to Jamaica Ave.; Chestnut St., from Myrtle Ave. to Jamaica Ave., Forth Ward, James H. Johnson, \$15,755.87. Sewer and appurtenances in Smart Ave., from Queens Ave. to Narcissus St.; Narcissus St., from



Smart Ave. to Bowne Ave.; Bowne Ave. from Narcissus St. to Oak Ave., Third Ward, Green Contracting Co., \$5,810.69. Receiving basins and appurtenances on the northeast and northwest corners of Emerson St. and Oxford Ave., Fourth Ward, John J. Long & Co., Inc., \$360. Receiving basin and appurtenances on the easterly corner of Twelfth Ave. and Graham Ave., First Ward, Evergreen Construction Co., \$135. Sewer basin and appurtenances on the southeast corner of Myrtle Ave. and Decatur St., Second Ward, Peace Bros., \$155. Sewer and appurtenances in Willard (Vanderveer) Ave., from Fulton St. to Ridgewood Ave., and in Ridgewood Ave., from Hatch Ave. to Walker Ave., Fourth Ward, Joseph L. Sigretto & Co., \$8,781.67.

**Cleveland, O.**—To W. P. Gibbons Contracting Co., 3135 Scranton Road, at \$13,456, for sewers.

**Medina, O.**—To Glenn W. Hadley, Canton, at \$5,612, for laying 8,811 ft. of sewer pipe and manholes. George L. McNeal is village clerk.

**Norwood, O.**—For constructing sanitary sewer in Lexington Ave., to John Dempsey, Norwood, at \$7,500.

**Springfield, O.**—Supplemental contract has been approved with Patrick Caffrey for \$782 worth of additional sewer work for surface drainage in Glenwood Ave. in connection with Indian Run sewer, and another with James Doyle for additional work on Gallagher St. sewer.

**Toledo, O.**—By county of Lucas, for 8, 10, 12 vitrified sewer pipe, to J. N. Bick, 601 Nasby Bldg., Toledo, O.

**Philadelphia, Pa.**—Bids were opened Sept. 29 by Chief Webster, of Bureau of Surveys, for extensive improvements, such as building of sewers and bridges, which will cost about \$400,000. Forty-one branch sewers and six main sewers are to be constructed. One of main sewers will complete important step toward preparing the way for the finishing of the Cobbs Creek Parkway. This sewer, an intercepting one, is to be constructed in parkway from the present terminus, at 68th St. to 69th St. The low bidder for the work is Adolph Jaffola. He offers to construct the sewer for \$16,555. Other main sewers are to be constructed in Indiana Ave., between Marshall and 7th St.; Lardner St., from the Delaware River to Tacony St., and across private property to the present sewer northwest of the Philadelphia and Trenton Railroad; North Pleasant Ave., from Kitchens Lane to Wissahickon Ave.; Snyder Ave., between the present sewer east of Delaware Ave. and the Delaware River, and in Howard St., 65 ft. northwest of Front St. Low bidders for main sewer work are: Lardner St. sewer, Richard Walsh & Son, \$61,551; Indiana St. sewer, Joseph Lombardi, \$11,623; Mount Pleasant Ave. sewer, estate of David McMahon, \$11,698; Snyder Ave. sewer, C. A. Conan, \$16,076; and Howard St. sewer, the Frank Mark Construction Co., \$19,750.

**Huntington, W. Va.**—By city, to J. H. Sluss Construction Co., Huntington, at \$3,877, to construct 10-in. and 12-in. lateral sewers.

**Pullman, Wash.**—To James C. Broad, 604 Jamieson Bldg., Spokane, Wash., for sewers in imp. dist. 34 at about \$12,000.

**Seattle, Wash.**—For overflow sewers into Lake Washington Canal, to Henry G. Niblett, at \$4,316.65.

**Kenosha, Wis.**—To James Kennedy, Kennedy Block, Fargo, N. D., by city, at \$149,828, for following sewer construction: 7,290 ft. 6-in., 8,190 ft. 48-in., 2,915 ft. 42-in., 70 ft. 36-in., 40 ft. 24-in., 2,770 ft. 22-in., 640 ft. 20-in., 3,005 ft. 18-in., 3,255 ft. 15-in. and 600 ft. 12-in. monolithic concrete sewers.

**Milwaukee, Wis.**—To A. J. Hewitt, for building sewer under Lake St. to cost \$160,000, 7 ft. in diameter, 43 ft. under ground.

## WATER SUPPLY

**Winter Park, Fla.**—Election has resulted in favor of issuing water bonds in sum of \$5,000.

**Galesburg, Ill.**—At meeting of Retail Merchants' Association at Galesburg Club Bldg., movement for increased water supply and for extensions of main system and for greater electric lighting capacity was given decided impetus when association by unanimous vote, got behind movement and endorsed proposition of \$95,000 bond issue.

**Fort Dodge, Ia.**—Election will be held early in October to vote on question of

issuing municipal dam bonds in sum of \$100,000.

**Louisville, Ky.**—Erection of various fire hydrants has been ordered.

**Madison, Me.**—Madison voters, who recently filed petition with public utilities commission of Maine, alleging poor water service by Madison Water Co., have voted to appoint committee to confer with company to see for what sum of money company would be willing to sell its plant.

**Lynn, Mass.**—Bids will shortly be called for on the Ipswich river pumping station, which forms last link to connect river water with Lynn's increased storage system.

**Pittsfield, Mass.**—It has been voted to lay 100 ft. of water main in Pinehurst St., 150 ft. of water main in Thomson Pl. to High St., 200 ft. of water main in Yarmouth St.

**Watervliet, Mich.**—New water system is being considered. City Engineer Stevens, of Dowagiac, is mapping village and preparing estimates for new plant. It is proposed to bond for \$18,000 for the purpose, and question will be submitted to vote of people at election to be held in near future.

**Washington, Mo.**—Election has resulted in favor of issuing water works coupon bonds in sum of \$60,000. P. H. Peitz is Mayor.

**Bayonne, N. J.**—New 16-in. water pipe is being considered for 22d St.

**Wallington, N. J.**—Bids for furnishing and laying of water mains, hydrants, specials, valves, etc., received by mayor and council, have been opened and laid over until next regular meeting, Oct. 11.

**Rochester, N. Y.**—Clerk Pifer has been instructed to advertise for 25 tons of pig lead for water works bureau. City buys lead in such quantity and then sells to contractors with idea of having uniform quantity of lead used on the work.

**Rochester, N. Y.**—Finance committee has reported favorably on requests of Comptroller, and council adopted ordinances directing making of city note for \$100,000 for water works extension and reissuance of \$9,000 city notes for park purposes.

**Findlay, O.**—W. C. Musser, superintendent water works, has prepared plans for water mains in West Park to cost about \$5,000. Joseph Page is city clerk.

**Marion, O.**—Petition for extension of water mains on Wood St., from Davids st. to Hocking Valley Railroad, has been referred to water works committee.

**Amity, Ore.**—Ralph Marvin, city engineer, has been instructed to prepare plans for waterworks, to cost about \$15,000.

**Baker, Ore.**—Notice is given that there will be held in city of Baker, Baker County, Ore., on 11th day of October, 1915, special municipal election for purpose of determining whether or not 20-year 5 per cent bonds of said city shall be issued and sold in sum of \$118,000 for purpose of making necessary improvements of present water system of city of Baker, and extending of said system to end that all of waters now owned by city of Baker may be brought into city for municipal purposes.

**Chester, Pa.**—Fire officials and business men of this city are formulating plans for laying of high water main along river front for purpose of protecting manufacturing district of city. It is proposed to lay high pressure main entire length of Front street, to be connected with pumps in many of large industries along the river.

**Chester, Pa.**—Fire officials and business men of this city are formulating plans whereby high-pressure water main will be constructed under entire length of Front St. in order to afford industries along river front greater protection against fire. Proposed main will extend from Ridley River on north to Trainer on south, distance of about 4 miles, and will be connected with large pumps in many of plants along Delaware River.

**Punxsutawney, Pa.**—E. W. Hess, borough engineer of Clearfield, has been engaged to prepare estimates, etc., for submission to public service commission, to secure permission to install municipal waterworks.

**Waynesboro, Pa.**—The Waynesboro Water Co. at special meeting has decided to build new reservoir at once. This addition to Water Co.'s equipment will be large in size, perhaps big enough to hold 75,000,000 gals. of water.

**North Smithfield, R. I.**—Villages of Slatersville and Forestdale, in town of North Smithfield, will have water service before many months, according to steps taken by Town Council at its regular monthly meeting.

**Benton, Tenn.**—Election will be held Oct. 30 to vote on question of issuing water bonds in sum of \$10,000.

**Knoxville, Tenn.**—Bonds in sum of \$500,000 for improvements and extensions to water works system will be voted on.

**Galveston, Tex.**—Authority was accorded City Engineer A. T. Dickey to advertise for bids covering reconstruction of submerged water main across the bay. The estimated cost of reconstructing this main with 30-in. pipe is \$41,220. The engineer presented to the board a design of proposed main.

**Norfolk, Va.**—Finance Committee has voted to recommend to council that \$36,102, or as much thereof as may be necessary, be authorized for purpose of repairing two Little Creek dams and spillway. It was decided to postpone for future rebuilding of Lake Taylor dam and spillway, estimated to cost about \$23,000, and repair of clear water basin, estimated at cost of \$28,000. Committee also rejected recommendation of T. B. Dornin, water department engineer, as to amount of rip-rapping necessary and as to dredging in front of spillways at cost of about \$1,000.

**Norfolk, Va.**—W. W. Gwathmey & Wm. H. Taylor, expert engineers, in reports have recommended that dams and spillways at Little Creek be repaired at cost of \$36,102, that new dam be built at Lake Taylor and spillway repaired at cost of \$23,082.

**Olympia, Wash.**—City Council of Olympia has passed ordinance calling for bond issue of \$100,000 to take over local water system and make it a municipal proposition.

**Seattle, Wash.**—A. H. Dimock, city engineer, has submitted plans and specifications to board public works for constructing water mains in Dexter Ave., to cost about \$32,000.

## CONTRACTS AWARDED.

**San Francisco, Cal.**—By board of works to Ingersoll-Rand Co. and Rix Compressed Air Co. for air-compressing plant and drills for use at Hetch Hetchy project.

**St. Charles, Ill.**—By board local improvement for water main extension, including 255.92 tons 6-in. and 4-in. pipe, 490 tons special castings, 32 fire hydrants, 9 4-in. hub end double gate valves, and valve boxes, 12 6-in. hub end double gate valve and valve boxes, 17,605 lin. ft. trenching and laying and calking pipe, to H. D. Hallet, Aurora, \$12,113; other bids as follows: Delhannty & Co., Decatur, \$13,302; Albrecht Bros., Kewanee, \$12,308. Engineer's estimate, \$12,849.

**Terrill, Ia.**—To Public Service Constr. Co. of Omaha, at \$7,379, for water system; other bids as follows: G. W. Roland & Co., Des Moines, \$7,708; W. D. Lovell, Mpls., at \$7,666; Des Moines Bridge & Iron Co., Des Moines, \$7,564.

**Carlton, Minn.**—To Pastoret Co. of Duluth, for water system consisting of about 1½ miles mains, pump station.

**Macon, Mo.**—For filtration plant and settling basin as follows: Middleton & Ludlow, Kansas City, \$5,990; mechanical equipment for filter plant, Pittsburgh Filter Mfg. Co., Kansas City, \$4,310; steel pipe, Fairbanks, Morse & Co., Kansas City, at \$6,018.

**Chino, Mont.**—To Pittsburgh Filter Mfg. Co. for construction of filter plant at \$16,415.

**Broken Bow, Neb.**—To Alamo Engine & Supply Co., Omaha, for constructing wells and extensions to waterway system and electric light plant. R. C. Thompson is city clerk. Estimated cost, \$16,000.

**Albion, N. Y.**—Board of trustees has carried following resolutions in connection with new water plant improvements. Bid of Charles R. Lewis, of Ilion, N. Y., for doing necessary work in reconstructing the present filter beds and basin to conform to revised plan for use as sedimentation and coagulating basins for waterworks, at not to exceed \$2,200. Bid of Tyler & Wilson, of Albion, N. Y., f. o. b. cars, at Albion, at which point they agreed to take materials thus furnished and do work of installing in every particular for total sum of \$298.45, as per their bid of Sept. 15, 1915. Bid of W. J. Quigley, of Buf-

falo, N. Y., covering furnishing of materials for sealing plant for the Albion waterworks pumping station and filter plant in the amount of \$364.26, f. o. b. cars, at Albion, N. Y., be accepted as per his bid.

**Manchester, N. Y.**—To Bliven & Beals, of Rochester, at \$23,419, for installation of water works system to include pipe line, pump well and pump houses. Contract for valves and hydrants to Eddy Valve Co., of Waterford, N. Y., and for standpipe to Tippet & Wood, of Phillipsburg, N. J.

**New York, N. Y.**—To F. N. Kewis, 411 Manhattan Ave., New York, at \$13,411, for water-pipe equipment in shafts of city tunnel of Catskill Aqueduct.

**Brewster, O.**—To Ross-Cook Engineering Co., 193 Brosby St., Akron, at \$19,000, for water system. W. J. Sherman Co., Nasby, Toledo, is engineer.

**Medina, O.**—For 12,336 ft. 4-in. pipe, 37-in. valves, 15 hydrants, etc., to Lynn & Cahoon, Akron, at \$7,884. E. E. Eckard is city clerk.

**Middletown, O.**—Contract to furnish pipes for new water works system in Middletown was let Sept. 24 by City Commissioners to American Cast Iron Pipe Co., of Birmingham, Ala.

**Philadelphia, Pa.**—Bids were opened Sept. 30 for furnishing and installing 3 10,000,000-gal. turbo-centrifugal pumps at Shawmont pumping station. New pumps are to replace four old ones of 5,000,000-gal. capacity each. They will force water to Roxborough filtration plant. Low bidder for work is M. L. Bayard, whose figure is \$90,000. Bids also were opened for cold storage equipment for Queen Lane pumping station. The Wilmont Engineering Co., of Hazleton, was low with bid of \$16,317.

**South Bethlehem, Pa.**—For installing system in University Heights, near South Bethlehem, to Standard Supply Co., Philadelphia, at about \$10,000.

**Gayville, S. D.**—For water distributing system to Ellerman & McLain, Yankton, S. D., at \$3,517; for building, \$1,100; for pumping machine, \$960, and for tower and tank, \$3,400. Total, \$8,977.

**Mycon, Utah.**—To J. C. Lyman, 722 6th Ave., Salt Lake City, at \$10,350, contract to install water works system to consist of steel tower and tank, concrete well and building, 6 hydrants and 10-in. and 4-in. wood pipe, pump and motors.

**Stratford, Ont.**—Public utilities commission contract for standpipe, segmental type, to Canadian Chicago Bridge & Iron Works, Sarnia, at \$24,800, exclusive of base and two pumps.

### LIGHTING AND POWER

**Little Rock, Ark.**—Board of Public Affairs and the finance and lighting committees of the City Council are considering plans for installation of about 200 additional street lamps in outlying districts. Cost is estimated at about \$25,000.

**Hurbank, Cal.**—Election will be held on Oct. 12 for voting on \$30,000 bonds for electric-light plant and distributing system.

**Oak Park, Cal.**—Effort will be made to induce property owners along 35th St. to install electroliners. Petition calling upon city commissioners to establish electroliner district along 35th St., between Madrone and Park Aves., has been put in circulation.

**Pasadena, Cal.**—Plans have been taken toward changing ornamental lamp clusters in central part of city to nitrogen lamps mounted on single standards. It is proposed to add 6 in. to present posts.

**Santa Ana, Cal.**—Plans are being discussed for installation of ornamental cluster lamps on Main and Fourth Sts.

**Santa Ana, Cal.**—Property owners on Fourth St. are planning for installation of ornamental lights.

**Pueblo, Col.**—Plans are ready for installation of ornamental street lamp standards on Second, Third and Fourth Sts., between Main St. and Santa Fe Ave.

**Galesburg, Ill.**—Two separate proposals will be submitted to people for ratification at coming bond election as result of changes of old ordinance which will be passed by council at special meeting. One proposal will ask approval for issuing bonds for improvement of electric-light plant, and other will deal with improvements of city water plant.

**Sterling, Ill.**—City council is considering extending ornamental street-lighting system in Sterling.

**Streator, Ill.**—Resolution has been passed providing for installation of ornamental lighting system on Main St. to Illinois St. and on Vermillion St. from Hickory to Bridge St.

**Richmond, Ind.**—Preliminary action has been taken towards installing ornamental lighting system in central business district of city.

**Richmond, Ind.**—Supt. Kleinknecht has submitted plans and specifications for ornamental lighting system to be installed on North 9th St. between Main and North A Sts. Plans provide for thirteen ornamental standards, each to be surmounted by either nitrogen lamps capable of burning for 1,000 hours, or magnetite lamps. Standards are to be of cast iron and connected by underground steel armored cable capable of carrying 7,000 volts. Cables are to be placed just below paving bricks on sand cushions and lamps are to be so connected that any number of them can be turned off after midnight. Board will at once order advertising for bids.

**Cedar Falls, Ia.**—Extension of Main St. electroliner system on north to Illinois Central tracks and on south to 6th St. is desired.

**Atwood, Kan.**—Black & Veach, engineers, 507 Interstate Bldg., Kansas City, Mo., are preparing plans for municipal electric-light plant, to cost about \$14,000.

**Eric, Kan.**—Installation of "white way" in business section is being discussed.

**Port Huron, Mich.**—Sarnia, Ont., will vote on offer of \$155,000 for local electric light company's plant. Citizens will vote later on proposal to use hydro-electric power.

**Saginaw, Mich.**—North Side business men and property owners have taken steps toward installation of ornamental lighting system on West Genesee Ave. from bridge to Michigan Ave. and probably to Fayette Ave.

**Saginaw, Mich.**—Bids will be received Oct. 14 for installation of modern electric alarm system for police department.

**Minneapolis, Minn.**—Cluster lamps may be extended on Hennepin Ave. to Harmon Pl.

**St. Joseph, Mo.**—Ordinance has been passed appropriating \$5,000 for white way conduits and lamp posts on Noyes Boulevard, from white way fund.

**Portsmouth, N. H.**—Business men on Vaughan St. are taking steps for installation of an ornamental lighting system on that thoroughfare.

**Hillsdale, N. Y.**—Petition is in circulation in Hillsdale for signatures of resident taxpayers for purpose of forming electric lighting district.

**Rochester, N. Y.**—Ordinance for additional lighting of Clinton Ave. North, from Main St. East to Central Ave., has been introduced by Alderman William Kohlmetz, of Fifth Ward. Cost is estimated at \$273.75 a year. Another lighting ordinance has been introduced by Alderman Somers calling for lighting of South St. from Court St. to Griffith St., at an annual cost of \$547.50.

**South Dayton, N. Y.**—Notices are out for special election to be held to vote on proposition of installing lights on streets of this village.

**Canal Fulton, O.**—Council has rejected offer of Massillon Electric & Gas Co. to place 66 100-candlepower electric lights in residence district and six 250-candlepower lights in business section at cost of \$1,855. Present contract with light company expires in January, 1916.

**Green Camp, O.**—Village council of Green Camp has awarded bonds in sum of \$5,000 to Mansfield Savings Bank for purpose of lighting village by electricity. Bonds sold for premium of \$50.50.

**Muskogee, Okla.**—At special election held here, Muskogee voted bonds in sum of \$350,000. The money is to be used to build municipal pipe line and bring cheap natural gas into city for manufacturing purposes. Bonds carried by vote of 1,414 to 299. A sum of \$25,000 was also voted for summer extension.

**Roseburg, Ore.**—Petitions are being circulated asking City Council to issue \$225,000 in bonds for installation of municipal electric lighting system.

**Williamsport, Pa.**—City council delayed action on electric light question Sept. 27, when special meeting was held primarily to award contract, by holding up resolution offered by Mayor Samuel Stabler, which provided that bid of the Lycoming-Edison Co., at \$39.60 per light for three years, be accepted. The bids will be considered at next regular meet-

ing of council, which will take place Monday, Oct. 4.

**Knoxville, Tenn.**—The Knoxville Railway & Light Co.'s city lighting contract expires on Oct. 24. Therefore, a new contract for lights will be one of important matters new city commission will have before it at early date.

**San Augustine, Tex.**—City Council has appointed a committee to make investigations as to cost of installing municipal electric lighting plant.

**Seattle, Wash.**—Bids will be opened Oct. 8 on approximately 292,350 incandescent lamps to be used by lighting department.

**Racine, Wis.**—Steps toward securing Corinthian lights on Main St., from State to 3d Sts., are being taken by merchants on this stretch of street.

**Granton, Ont.**—Installation of new hydroelectric system, to cost about \$5,000, is being considered by Town Council.

### CONTRACTS AWARDED.

**Jackson, Mich.**—For standards for ornamental lighting system to King Foundry Co., at \$30 each.

**Manchester, N. H.**—By city officials contract with Manchester Traction, Light & Power Co. for lighting streets of city for period of five years. The new contract provides for 580 arc lamps and 466 tungsten lamps. The lighting of Elm St. has not yet been decided upon. It is expected that ornamental lamp standards will be used.

**Millville, N. J.**—City Commission has awarded contract for complete electric light system for city to Millville Electric Light Co.

**Lake Placid, N. Y.**—By vote of taxpayers of Lake Placid at special village election held on Wednesday, Board of Trustees of Lake Placid has been authorized to make contract with Paul Smith's Light, Heat, Power and Railroad Co. for as much electric current for power and lighting purposes as is required over and above what municipal plant can produce. A transmission line will be built by company to eastern boundary of village and village will build transmission line to connect with it. Contract between power and lighting company will cover period of five years and village of Lake Placid will expend sum of \$10,000 in construction of its connecting transmission line.

**White Plains, N. Y.**—For heating and ventilating in new court house to Teran, Mahoney & Munro at \$18,000.

**Cincinnati, Ohio.**—For mechanical equipment, including complete power and other electrical equipment, to Standard Engineering Co., at \$203,855. S. Franklin Gardner is engineer in charge.

**Coshocton, O.**—Electric lights will be installed along streets of West Lafayette. Council has let contract for installation of fifteen 2-0-candlepower lamps to Ohio Service Co. Their bid was \$40 per lamp.

**Hamilton, O.**—Two contracts have been awarded by city board of control. The Equitable Meter Co., of Pittsburgh, was given contract to furnish 500 gas meters, at \$5.25 each.

**McAlester, Okla.**—City of McAlester has made contract with Gladys Belle Oil Co. for 70,000 cu. ft. of natural gas daily to be used at pump station. Contract price was 8c. per 1,000 ft. The Gladys Belle Co. recently drilled well near McAlester with 1,000,000 ft. capacity daily and will have gas piped into city by Oct. 15.

### FIRE EQUIPMENT

**Lordsburg, Cal.**—Sum of \$5,000 has been voted, \$3,000 for purchase of combination chemical hose and ladder truck and equipment, \$500 for installation of alarm system and \$1,500 for purchase of lot and fire station.

**Los Angeles, Cal.**—Fire Chief A. J. Eley has recommended installation of fireboat and purchase of following motor apparatus: Eight combination pumpers and hose cars, 4 combination chemical and hose cars, 3 city service trucks, 8 tractors, 7 cars for battalion chiefs and a number of chasses.

**Smartsville, Cal.**—Yuba County supervisors have adopted plans and specifications for bridge across small creek near Smartsville and for extension to Timbuck bridge. Both will be on Marysville-Smartsville Rd. Total cost will be about \$2,500.

**Deland, Fla.**—Installation of fire alarm system is under discussion.



**Poplar Grove, Ill.**—About \$8,600 may be expended on fire protection improvements.

**Springfield, Ill.**—Combinations of equipment and prices submitted to commission for fire equipment are as follows: 1 Seagrave 75-ft. aerial ladder, \$9,600; 2 Ahrens-Fox pumping engines, \$14,850; total, \$24,450. One La France 75-ft. aerial ladder, \$10,500; 2 Ahrens-Fox pumping engines, \$14,850; total, \$25,350. One Seagrave 75-ft. aerial ladder, \$9,130; 2 Seagrave pumping engines, \$16,625; total, \$25,755. One La France 75-ft. aerial ladder, \$10,500; 2 Seagrave pumping engines, \$16,975; total, \$27,475. Contracts will not be awarded for a few days.

**St. Charles, Ill.**—Purchase of combination motor apparatus is recommended.

**Sault Ste Marie, Mich.**—Purchase of 1,000 ft. of 2½-in. fire hose is being considered.

**South Lyon, Mich.**—Committee is investigating chemical apparatus.

**Albert Lea, Minn.**—Bids will shortly be asked for 1,000 ft. of fire hose.

**Biloxi, Miss.**—Question of purchasing motor apparatus and issuing bonds for same is being discussed by Council.

**Atlantic City, N. J.**—With intention of supplying horse-drawn apparatus in fire department with motor-driven equipment. Commissioners have given out contracts for four new fire engines and four hosecarts, all operated by gasoline power.

**Geneva, N. Y.**—Citizens have voted in favor of issuing \$18,500 in bonds for motorization of department.

**Glens Falls, N. Y.**—Installation of telephone and additional alarm boxes will be postponed until next year. John Mack is Chief.

**Monsey, N. Y.**—Special election may be called for Oct. 13 to vote on question of issuing \$4,000 in bonds for purchase of apparatus.

**Schenectady, N. Y.**—Two tractors may be purchased shortly.

**Schenectady, N. Y.**—Bond issue of \$8,000 has been asked for, \$5,000 for purchase of tractor for No. 2 hook and ladder truck and \$3,000 for chassis for No. 9 gasoline engine.

**Greensboro, N. C.**—Bids are being considered on new fire truck.

**Raleigh, N. C.**—The city commissioners have under consideration purchase of 75-ft. aerial truck as reinforcement for fire-fighting equipment of the city. Mayor Johnson and Commissioner of Public Safety O. G. King having just returned from Richmond, where they witnessed a successful demonstration of such a machine. Cost to city will be \$10,000 or possibly something more than that amount.

**Lima, O.**—It is probable that motor equipment will be installed at central, south and north fire stations.

**Lima, O.**—It is now certain that start toward motorizing Lima's fire equipment will be made this year. City council in special meeting passed legislation under which bonds for \$15,000 will be sold and Safety Director Goodyear will be authorized to buy apparatus for Central, South and North fire stations. There was no objection and meeting was brief.

**Salem, O.**—Petitions may again be circulated for bond issue for motorization of chemical wagon and installation of an alarm system.

**McAlester, Okla.**—City Council has advertised for bids for purchase of 6-cylinder motor propelled combination pumping engine and hose car to be capable of throwing 750 gals. per minute and carrying 1,500 ft. of 3½-in. hose. New engine is to be added to equipment of fire department.

**Enola, Pa.**—The Enola Fire Co., No. 1, will hold citizens' meeting to arrange plans for purchase of new motor-driven apparatus. All citizens of 'cross-river' town have been requested to be on hand at these meetings. One of fire engines will be exhibited about hills and in town during the day.

**Williamsport, Pa.**—Installation of alarm system is under consideration.

**Central Falls, R. I.**—At monthly meeting of Common Council one of resolutions for consideration will be that of making appropriation of \$3,500 to purchase motor-driven combination hose and chemical wagon for fire department.

**Newport, R. I.**—Aldermen have been authorized to purchase not exceeding 3,000 ft. of hose from any unexpended fire department balances.

**Newport, R. I.**—Board of Aldermen is discussing question of installing police alarm system.

**Hoquiam, Wash.**—Purchase of 1,200 ft. of fire hose has been ordered.

**Seattle, Wash.**—Following bids were received on auto fire apparatus and have just been tabulated by the purchasing agent: 7 pieces of apparatus: Seagrave Co., \$36,218; J. Boyd & Bros., \$37,000; Robinson Fire Apparatus Co., \$37,040; same (4-cylinder motors), \$35,340. 5 pieces (not including 2 tractors): White Co., \$30,015. 2 tractors only: Front Drive Motor Co., \$9,700. 5 chassis: Seagrave Co., \$23,500; J. Boyd & Bros., \$23,200; Robinson Fire Apparatus Co., \$20,500; same (4-cylinder motors), \$18,330; White Co., \$21,175. The contract for apparatus probably will be awarded next week.

**Victoria, B. C.**—To secure fire apparatus of modern type and to provide for building of hall for its accommodation council of Esquimalt municipality, suburb of Victoria, will submit two by-laws to ratepayers to raise \$30,000. One will sanction purchase of 6-cylinder chain-drive gasoline motor equipped with triple combination pumper hose and chemical hose. It is estimated that this will cost, together with extra parts and charges for floating the loan, \$15,000. Other by-law will cover cost of a structure large enough not only to house the fire department, but also to serve as a municipal hall and police station. The expenditure involved in this project also is put at \$15,000. Address all communications to Municipal Engineer, Municipal Offices, Esquimalt Road, Victoria, British Columbia. (Bureau of Manufacturers, Washington, D. C.)

#### CONTRACTS AWARDED.

**Melrose, Mass.**—To the Seagrave Co., Columbus, O., through D. Arthur Burt, contract for motor city service truck.

**Ocean Grove, N. J.**—For motor triple combination wagon to American-La France Fire Engine Co., Inc., Elmira, N. Y., at \$8,500.

**Rochester, N. Y.**—Contract for supplying 8,000 ft. of insulated leaden cable for fire alarm system was let to the National India Rubber Co., of New York, for \$966.

**Cleveland, O.**—For furnishing a tractor-drawn steam engine, to American-La France Fire Engine Co., Elmira, N. Y., at \$7,837.50.

**Philadelphia, Pa.**—Lowest bid for furnishing tractor-drawn steamers was that of American-La France Fire Engine Co., Inc., Elmira, N. Y., at \$7,837.50 each.

#### BRIDGES

**Florence, Ariz.**—County Commissioners are planning to construct two concrete bridges over Gila River, near Winkelman, to cost \$30,000 each. E. R. Stafford is county engineer.

**Florence, Ariz.**—Plans and specifications are said to be desired by supervisors for two bridges over Gila River, one at Wilkeman and other at Kelvin; cost, \$30,000 each. E. S. Stafford is county engineer.

**Marysville, Cal.**—The Yuba County Supervisors have adopted plans and specifications for bridge across small creek near Smartsville, and for extension to Timbuck bridge. Both will be on Marysville-Smartsville Rd. Total cost will be \$2,200.

**Rome, Ga.**—Election has resulted in favor of issuing 4½ per cent bridge bonds in sum of \$225,000.

**Bedford, Ind.**—A \$14,000 issue of Lawrence county bridge bonds were sold Sept. 23 by County Auditor Ezra Edwards to Breed, Elliott & Harrison, of Indianapolis, at premium of \$208 with accrued interest.

**Crown Point, Ind.**—Bonds in sum of \$116,000 may be sold Oct. 28 by Edw. Simons, county auditor, for bridges in Dyer and Hammond.

**Duluth, Minn.**—An \$8,000 concrete bridge will be built crossing Fischer's creek.

**Butler, Pa.**—Under act of late legislature, state highway department has been authorized to construct viaduct on South Main St., replacing old bridge with overhead street, thus doing away with dangerous grade crossings at north end of present bridge where Bessemer and Ohio Road crosses Main St.

**Johnstown, Pa.**—State Water Supply Commission has approved application of city of Johnstown for concrete arch bridge across Stonycreek, at Haynes St.

**Pawtucket, R. I.**—Resolution, passed by Board of Aldermen, directs City Engineer Carpenter to prepare estimate of

cost of new bridge over Blackstone river, at Exchange St., in accordance with recommendation made by Commissioner of Public Works in his annual report to City Council last December.

**Sioux Falls, S. D.**—County Commissioners will construct two new bridges in Hartford Township, both to be of steel and concrete, 20 ft. long and with 20-ft. roadways.

**Rockfort, Tex.**—County has voted \$300,000 bonds to construct causeway, from Rockfort to Lamar, across Arkansas Bay, about 13,000 ft. long.

#### CONTRACTS AWARDED.

**Oroville, Cal.**—For eight concrete bridges on State Highway between Durham and Nelson to Chico Construction Co., Chico, at \$12,987.

**Rockford, Ill.**—Bids were opened Sept. 24 at office of County Highway Commissioner A. R. Carter for construction of Leshar bridge in Laona township. Structure is to be of reinforced concrete and span is 16 ft. The Northern Steel & Concrete Co. secured job on its bid of \$1,899. W. C. Kiernan & Co. filed estimate of \$1,950.

**West Union, Ia.**—To Waterloo Construction Co., Waterloo, at \$12,980, for steel truss bridge in Oran Township, concrete deck girder bridge in Jefferson Township and concrete box culverts in Oran Township.

**Leavenworth, Kan.**—Bids of nine bidders for 27 county bridges have been opened and read by county commissioners. The Leavenworth Bridge Co. secured 21 of 27 bridges. E. F. Bowman had bids on three bridges accepted; J. F. Ward secured 2, and John Coldren, 1. The total amount of money named in the bids of the successful ones is \$26,787.30, which is \$4,748.70 under the total estimate submitted by Walter Thomas, county engineer.

**Scarboro, Me.**—For constructing concrete state bridge across Nonesuch River at Scarboro to Hassam Paving Co., Worcester, Mass., at cost, plus percentage.

**Roundup, Mont.**—Security Bridge Co., Billings, for constructing bridges across Musselshell River: The Gage bridge, 122.5 ft. span at \$6,988, and the Delphi and Ryegate bridges, each 140 ft. span, at a total of \$8,990. Ray E. Bushnell is county surveyor.

**Virginia City, Mont.**—To O. E. Peppard, for both bridges over Big Hole Creek, at \$8,980, extra concrete, \$12.25 per yd., grading approaches, 38c. per cu. yd.; other bids: Mpls. Steel & Machinery Co., Mpls., at \$9,900; Omaha Structural Steel Works, \$9,860; The Midland Bridge Co., at \$8,260; Jas. J. Burke & Co., \$8,576; L. J. Ross, at \$7,942, and \$2,000. W. H. Thomas is Clk.

**New Brunswick, N. J.**—Only one bid was received Sept. 27 by Board of Freeholders for erection of reinforced concrete slab bridge, or culvert, over Brace Ave., in Perth Amboy. Bid was presented by Chandler & Hoth, of 108 West 34th St., New York City, with estimate of \$1,865.

**South Amboy, N. J.**—For constructing Strauss bascule lift bridge over Matawan Creek, between Keyport and South Amboy, by board freeholders to R. F. Long-W. C. Broadhurst Co., Hackensack, at \$36,220.

**Cleveland, O.**—For foundation and approaches of Union Ave. grade crossing awarded to Robert Grace Contracting Co., Pittsburgh, Pa., at \$103,373; steel work, King Bridge Co., Cleveland, at \$34,892.

**Fredericksburg, O.**—For constructing steel bridge at Fredericksburg to Massillon Bridge & Structural Co., Massillon, at \$11,333. Next three lowest bidders: Penn Bridge Co., Beaver Falls, \$13,200; Wymer Harris Constr. Co., Youngstown, \$13,487; Capitol Constr. Co., Columbus, \$13,569. H. C. Fox is secretary department public service.

**Lima, O.**—Contract for construction of both Fifth St. and Franklin St. bridges in Delphos will be awarded to William Bonifas. Bonifas' bid on the Franklin St. bridge was \$1,097 and on the Fifth St. bridge, \$989.

**McAlester, Okla.**—City Council of McAlester has let contract to McEachin & McEachin of this city to build concrete bridge 25x40 ft. across Sandy Creek, contract price \$1,284. Another contract was let to J. W. Rooks of McAlester to build a concrete bridge across Sandy Creek, contract price \$953.45. Both bridges are to be completed within sixty days.

**Harrisburg, Pa.**—In awarding contracts for construction of bridges advertised by State Highway Department,

State Highway Commissioner Cunningham Sept. 30 served notice on bidders that all irregular bids would be thrown out and that policy of department during his administration would be to require completion of work at time and in manner prescribed in specifications. In number of instances low bidder did not receive award because of startling irregularities in bidding. Ninety-three bids were opened Sept. 30 and awards were made. The following gives counties and townships in which bridge is located, the name of successful bidder and the price: Cameron Co., Shippen, Twp.—Farrier Engineering Co., Pittsburgh, \$4,388. Monroe Co., Stroud Twp.—Jacob Stem, Stroudsburg, \$740.85. Centre and Clearfield Co.—Central Construction Co., Wooster, O., \$2,767.65; Wyoming Co., Falls Twp.—Anthracite Bridge Co., Scranton, Pa., \$1,776.28. Susquehanna Co., Great Bend Twp.—Anthracite Bridge Co., Scranton, Pa., \$1,594.30. Monroe Co., Paradise Twp.—Jacob Stem, Stroudsburg, Pa., \$1,633.49; Susquehanna Co., Clifford Twp.—Anthracite Bridge Co., Scranton, Pa., \$2,278.30. Cameron Co., Shippen Twp.—G. W. Ensign, Inc., Harrisburg, Pa., \$5,113.10. Susquehanna Co., Gibson Twp.—Anthracite Bridge Co., Scranton, Pa., \$1,917. Sullivan Co., Davidson Twp.—Whittaker & Diehl, Harrisburg, Pa., \$4,258.45. Wyoming Co., Eaton Twp.—Anthracite Bridge Co., Scranton, Pa., \$3,845.50. Susquehanna Co., Brooklyn Twp.—Anthracite Bridge Co., Scranton, Pa., \$1,931.50. Butler Co., Penn Twp.—Central Construction Co., Wooster, O., \$1,804.40. Elk Co., Ridgway Twp.—Will Dickinson, Ridgway, \$2,819.90. Monroe Co., Hamilton Twp.—Jacob Stem, Stroudsburg, Pa., \$1,253.25. Monroe Co., Pocono Twp.—Jacob Stem, Stroudsburg, Pa., \$680.63. Beaver Co., Raccoon Twp.—R. D. Hunter, Beaver, Pa., \$2,669.80. No award was made for bridge in Dingman and Milford Townships, Pike County, for reason that there was only one bid and the department officials decided that it was entirely too high. No award was made for bridge in Polk Township, Monroe County, for the reason that low bidder neglected to mention any unit prices and specified no time for completion of contract and only other bidder was price approximately twice as high as estimated value of bridge. No award was made for bridge in Pocono Township, Monroe County, for reason that error was discovered in bidding blanks prepared by State Highway Department, and as this gave insufficient information to the bidders it was decided not to make award.

**Philadelphia, Pa.**—Bridges to be constructed and low bids received Sept. 29 are: On the line of Orthodox St., over Frankford Creek, Donato Delise, \$25,355; on the line of 54th St., over the Philadelphia, Baltimore and Washington Railroad, Peoples Bros., \$34,990; on the line of Torresdale Ave., over Frankford Creek, Day & Zimmerman, \$30,756.50, and on the line of Sherwood Ave. over east branch of Indian Run, F. J. Boas, \$19,229. The bid on the Orthodox St. bridge is about 55 in excess of the money available for the work, and it will be readvertised.

**Philadelphia, Pa.**—Contracts awarded for bridges from bids opened Sept. 29: Sherwood Ave. over Indian Run—20-ft. concrete arch, 90-ft. long, rubble wings and face, grading, sodding, etc. Awarded to F. J. Boas at \$19,229. Low bid of seven received. Highest, \$28,378. Torresdale Ave. over Frankford Creek—70-ft. wide, 80-ft. span. Steel superstructure encased in concrete, on concrete abutments. Asphalt paving. Awarded to Day & Zimmerman for \$30,756.50. Low bid of eight received. Highest, \$48,536. 54th street over P. B. & W. R. R.—60 ft. wide, 150 ft. long. Main span 81 ft. Steel superstructure encased in concrete on concrete abutments. Asphalt paving. Not yet awarded. Low bid, Peoples Brothers, Inc., \$34,990.50. Seven received. Highest, \$45,711.50. Orthodox street over Frankford Creek—48 ft. wide, 80 ft. long. Two spans. Steel superstructure, concrete floor, on reinforced concrete foundations. Asphalt paving. Not awarded. Low bid in excess of estimate, \$25,355. Geo. S. Webster is Chief Engineer and Surveyor.

**Chattanooga, Tenn.**—Contract for building approaches of new Market St. bridge over Tennessee river has been let by Bridge Commission to G. W. Taylor, his bid aggregating something like \$10,000.

**Cleburne, Tex.**—City Council has let contract for cement bridge to Gregg Miller, who is to start work at once. Bridge is to span West Buffalo Creek, on Poindexter Ave. Mr. Miller's bid was \$647. This is first bridge of kind to span West Buffalo Creek.

### MISCELLANEOUS

**Sacramento, Cal.**—Preliminary steps toward construction next year of continuous dredger for sand levee from Knights Landing to Colusa, 50 miles in length, at estimated cost of \$500,000, were taken at meeting here of the Commissioners of Sacramento River West Side Levee District. The Commissioners instructed the district's engineers to prepare plans and specifications for levee for submission to State Reclamation Board.

**Wilmington, Del.**—Board of Health may have to advertise for new bids for disposing of garbage.

**Elgin, Ill.**—City council is said to be considering erection of incinerator and disposal plant; probable cost, \$12,000.

**Springfield, Ill.**—Bids for construction of retaining walls at subway under Wabash Railroad in South 6th St. were opened at city hall Sept. 27. They will lie over 48 hours to comply with law before contract can be awarded. It is likely that present act of bids will be rejected like first set, owing to fact that appropriation for work was \$3,000 and the lowest figure in the new let is \$4,303.30. Bidders and their bids as announced are as follows: E. S. Trimble, \$4,303.30. Miller & Husband, \$7,500.

**Fort Wayne, Ind.**—S. A. Greeley is to be employed to aid board in drawing specifications for garbage building and its furnaces.

**Fort Wayne, Ind.**—Samuel A. Greenley, a garbage engineer from Milwaukee, has been engaged by board of works to draft specifications for new garbage incinerating plant to be constructed by city. Mr. Greeley will confer with board and decide on proper location of plant and then will design one adapted to Fort Wayne's needs. He recommends two-unit plant, with each unit large enough to carry winter load alone and two of them big enough for summer load. Building will be made large enough to insure against future growth of city.

**Lexington, Ky.**—Options are to be secured on Lisle and Higginbotham tracts of land in western section of city of Lexington so that municipality may be in position to purchase one of sites selected by Engineer P. H. Norcross, of Atlanta, Ga., for sewage disposal plant in case proposed bond issue is authorized by the voters at November election.

**Beverly, Mass.**—New plans will be made and new bids asked for construction of sea wall at "Queen" park.

**Waltham, Mass.**—Finance committee will consider bid of Metz Company for police patrol and ambulance.

**Dowagiac, Mich.**—It is expected that survey for proposed Dowagiac river drain will be completed in a few days. Surveyors still contend that total cost of drain will be around \$40,000, or thereabouts, instead of \$75,000 or even \$100,000 which some of opponents of drain have stated cost would be.

**Ishpeming, Mich.**—Installation of garbage incinerator is being considered to cost about \$6,000.

**Duluth, Minn.**—Commissioner Farrell will purchase small steam shovel and motor truck.

**Little Falls, Minn.**—Purchase of police patrol is being discussed.

**Jefferson City, Mo.**—New petitions will probably be circulated immediately for submission of \$150,000 bond issue in Cole county.

**St. Joseph, Mo.**—Election may be shortly held to vote on \$15,000 bonds for garbage incinerator.

**Newark, N. J.**—Finance committee of common council has passed new resolution authorizing issuance of \$250,000 "dock improvement" bonds and rescinding former one providing for similar issue of "dock" bonds. Change in description was considered necessary to comply exactly with law authorizing the issue.

**South Orange, N. J.**—Township Board will place proposition of municipal garbage collection before voters at November election.

**Trenton, N. J.**—State Department of Commerce and Navigation opened bids Sept. 28 for dredging first section of extension of inland waterway connecting Barnegat Bay with the Manasquan River. Amount available for work is about \$20,000 and by bids submitted canal can be carried about three-fourths of mile from head of Barnegat Bay. Bids were as follows: Rickards Dredging Co., of Philadelphia, 15 8-10 cts. per cu. yd., with 40,000 cu. yds. to be excavated per month; Hill Dredging Co., of Atlantic City, 17 4-10 cts. per cu. yd., with 30,000 cu. yds. per month to be excavated; D. X. Shubin, of Philadelphia, 9 98-100 cts. per cu. yd., with 30,000 cu. yds. to be excavated per month, except the first and second month 15,000 cu. yds. will be excavated. Benjamin F. Cresson, chief engineer of the department, reserved decision on awarding the contract.

**Buffalo, N. Y.**—Howard L. Beck, city architect, is preparing revised plans for three-story addition to city garbage disposal plant, Hamburg St. and Lake Shore Railroad. Estimated cost, \$150,000.

**Buffalo, N. Y.**—Howard Beck, city architect, is revising plans for 3-story addition to garbage disposal plant at Hamburg St. and Lake Shore R. R., to cost about \$150,000.

**Dunkirk, N. Y.**—Purchase of lung-motor is urged for police department.

**Massillon, O.**—Plans and estimates for erection of two comfort stations near new viaduct in South Erie St., which extends west over river, canal, W. & L. E. and B. & O tracks, will be submitted to city council.

**Massillon, O.**—Councilman W. C. Koons has presented plans for erection of two comfort stations in South Erie St., at east end of new viaduct.

**Erie, Pa.**—Council is considering plans for a \$1,000,000 bond issue to prevent recurrence of Mill Creek flood.

**Meadville, Pa.**—New police call system is being considered.

**Central Falls, R. I.**—Resolution calling for appropriation of \$2,300 for purchase of a combination automobile ambulance and patrol, for use of police department, is being considered.

**Knoxville, Tenn.**—It is expected that acting Mayor Ammons will call special meeting of council soon, to pass on ordinance calling special election for issuance of \$30,000 worth of bonds.

**Aberdeen, Wash.**—By vote of 15 to 0 South Bay drainage district was carried at special election. The scheme is to build drainage ditch 3 miles long, which will give open waterway between Grays Harbor and Willapa harbor. There are small lakes to connect the ditch. Cost is estimated at from \$5,000 to \$15,000 and property along ditch will pay for it.

**Chehalis, Wash.**—Chehalis City Commissioners are planning to call special election at early date, at which question of voting \$62,000 city bonds will be submitted to people. It is proposed to use returns from these bonds in paying off all outstanding warrant indebtedness of city, so that saving of \$1,500 per year in interest may be secured.

### CONTRACTS AWARDED.

**Pensacola, Fla.**—For removal of garbage to L. Tillingham at \$250 per month.

**Bardwell, Ky.**—Fiscal court has received bids for construction of new county jail and inspection of working models of cell work. There were present two representatives of jail manufacturing establishments, the two being the Van Dorn Iron Works Co., of Cleveland, O., and the Pauly Jail Co., of St. Louis. Demonstrations of both cells were made, at conclusion of which sealed bids were opened and considered. Contract for building was let to X. B. Wickersham & Co., of Mayfield, Ky., price being \$8,720. For cell work and other iron work necessary in building, contract went to the Van Dorn Iron Works Co. at \$3,872.

**Mayfield, Ky.**—Contract for building new jail at Bardwell was let to X. B. Wickersham & Co., of Mayfield, his bid being \$8,720. For cell work and other iron work necessary in building contract went to Van Dorn Iron Works Co., of Cleveland, O., at \$3,872.

**Revere, Mass.**—To W. A. and H. A. Root, Inc., 1 Beacon St., Boston, at \$20,000, for incinerator and boiler house.

**Milwaukee, Wis.**—By city, for Lake St. tunnel construction to A. J. Hewitt, 810 Majestic Bldg., Milwaukee, at \$37,697.19.